TECHNOLOGY DEPT.

Grinding and Finishing

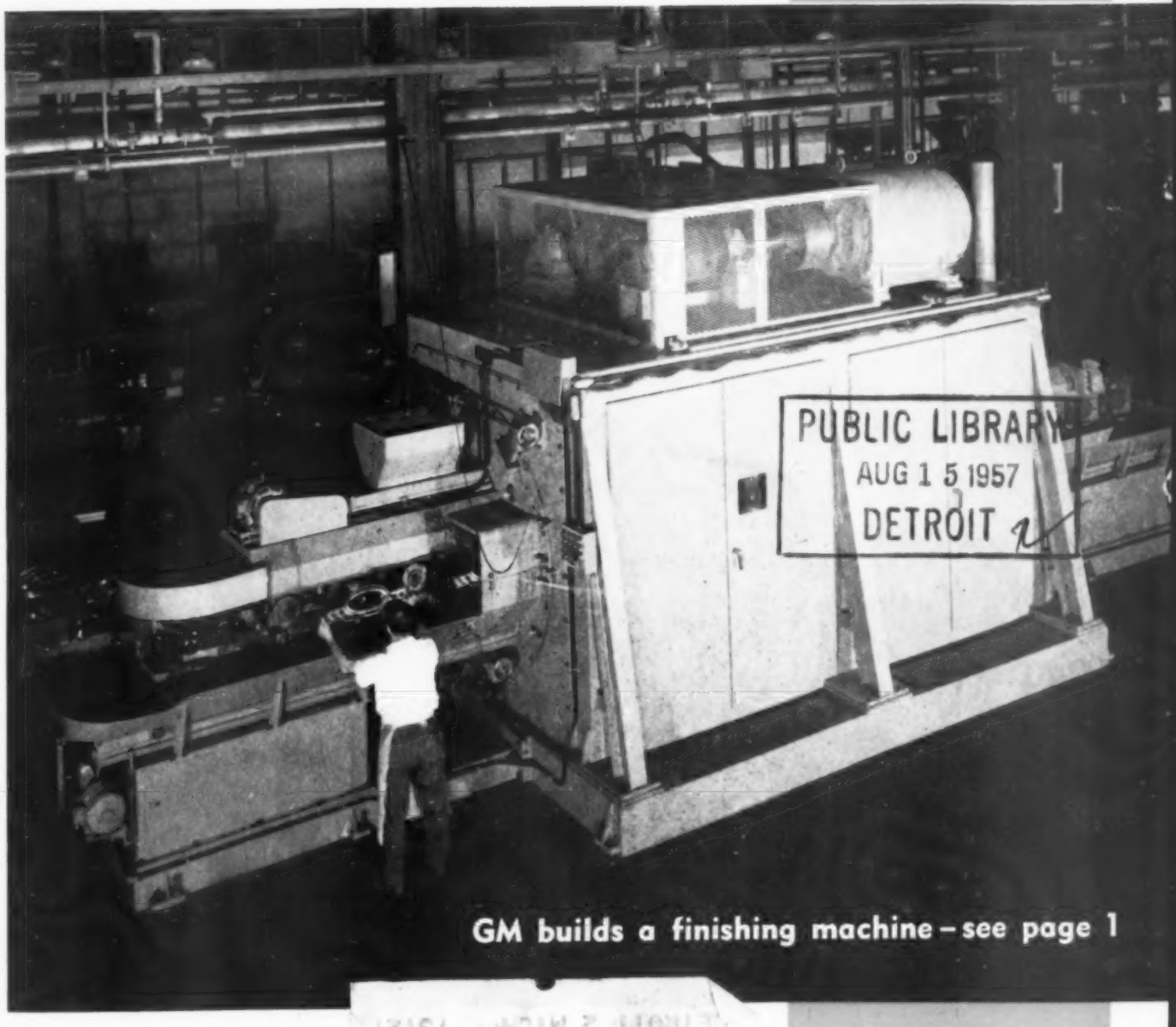
august 1957

in this issue:

How Watervliet Arsenal Hones Howitzer Hoops

Know Your Portable Air Grinder Costs?

First Published Description—Bryant's Centalign Wheelslide



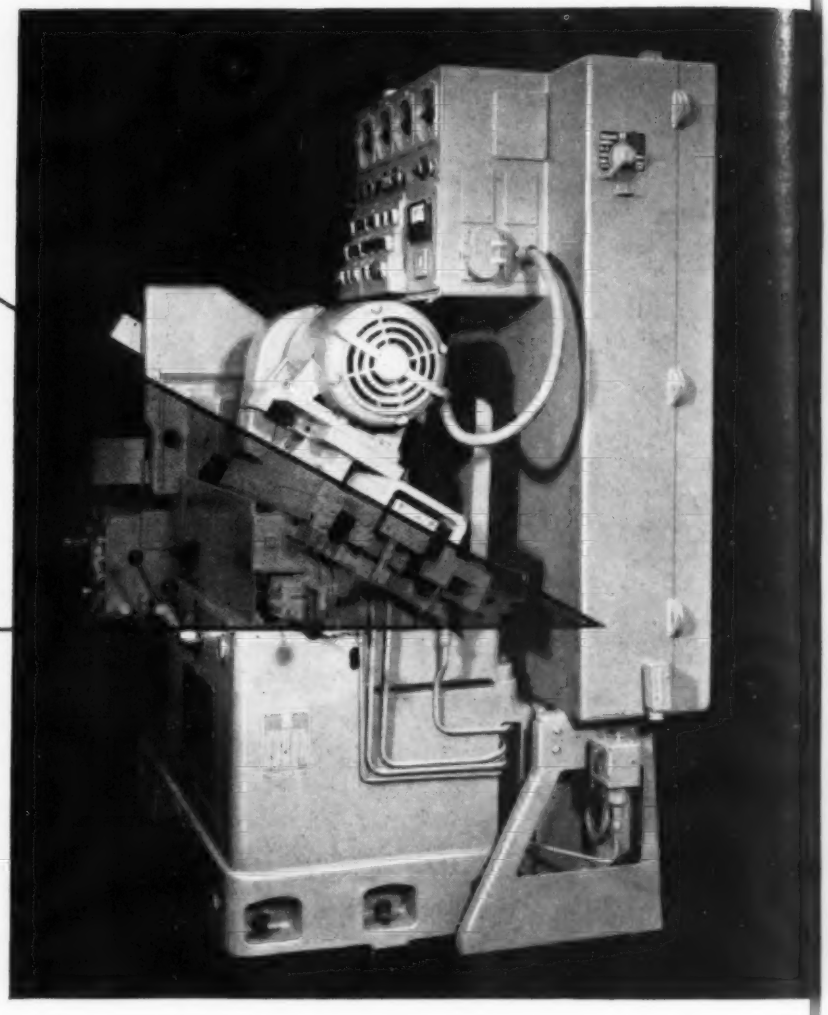
PUBLIC LIBRARY
AUG 1 5 1957
DETROIT

GM builds a finishing machine – see page 1

a hitchcock publication

New RITE-ANGLE CENTRI-MATIC

cuts grinding time as much as 50%



A NEW ANGLE in internal grinding gives greater strength and rigidity for faster stock removal, with highest accuracy and precision

The Heald RITE-ANGLE Centri-Matic represents the latest and most advanced design in the field of high-precision internal grinding. It includes all the basic advantages of other Heald internals — plus the added feature of substantially increased production rates. Mounting the wheelhead table at a 30° angle provides greater strength and stability and permits much faster stock removal.

Production economies due to faster grinding cycles are improved in all sizes of work handled on this equipment, but are most apparent in the larger (up to 4½" O. D.) sizes, where grinding time can be reduced as much as 50%.

This new RITE-ANGLE design is now available in the Model 190A Centri-Matic for straight and taper bores, and the Model 1901A Centri-Matic ball track grinder — both machines providing a new high in production, with maximum accuracy and precision, for work up to 4½" O. D. Ask your Heald representative for complete information or send for a copy of new RITE-ANGLE Bulletin.

OTHER ADVANTAGES

- Choice of Hi-Frequency or Belt-Driven Wheelheads
- Vee-Way Accuracy of Alignment with hardened and ground box-type table ways
- More Efficient Swarf and Coolant Disposal
- Infinitely Variable Hydraulic Cycles
- Automatic Feed Control with Self-Adjusting Diamond

IT PAYS TO COME TO HEALD

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

HEALD ®

Use postpoid card. Circle No. 300

Contents • August 1957

the magazine of abrasive metalworking operations

EDITORIAL STAFF

William F. Schleicher
vice president and editorial director

Jack Kenyon
managing editor

Dorothy Carlson
assistant editor

Marjorie Comstock
editorial assistant

Ronnie Burritt
consulting technical editor

John S. Todd
production manager

L. M. Schroeder
art director

Vera Boyer
reader service

BUSINESS STAFF

R. C. Van Kampen
president

Vincent C. Hogren
executive vice president

J. E. Hitchcock
vice president

Oliver S. Pepper
business manager

Bruce B. Howat
production director

F. S. Larson
advertising production manager

Robert L. Spreckels
circulation manager

Loren D. Jouett
marketing director

Subscription rates: $6.00 per year in U.S.A. $7.50 per year elsewhere.

Copyright, 1957, by Hitchcock Publishing Co., 222 East Willow Ave., Wheaton, Ill. Phone Wheaton 8-3400. Cable address: HITCHPUB Accepted as controlled circulation publication at Pontiac, Illinois.

BPA

Grinding and finishing

FEATURE ARTICLES

GM Designs a Finishing Machine 23
General Motors' Process Development comes up with a faster method of polishing die cast decorative trim. By Jack Kenyon.

How Much Does it Cost to Run Your Portable Air Grinders 27
Cost of compressed air power remains a low figure, but can you afford to gamble with such items as reduced pressure?

First Published Details of Bryant's Centalign Wheelslide 30
Heart of internal grinder is compact wheelslide construction. Wheelhead moves in preloaded ball sleeves.

How Watervliet Arsenal Hones Howitzer Hoops 33
Finishing the hoops shrunk onto the tube of the 8-inch Army howitzer was the problem. Solution: honing.

A Guide to Stainless Steel Finishing 36
Continuing two-part article begun in May. This month: Abrasive selection, operating techniques. By W. E. McFee.

Carboloy's Timekeeping System Eliminates Production Lags 46
Squawk boxes for workers are tied to central office.

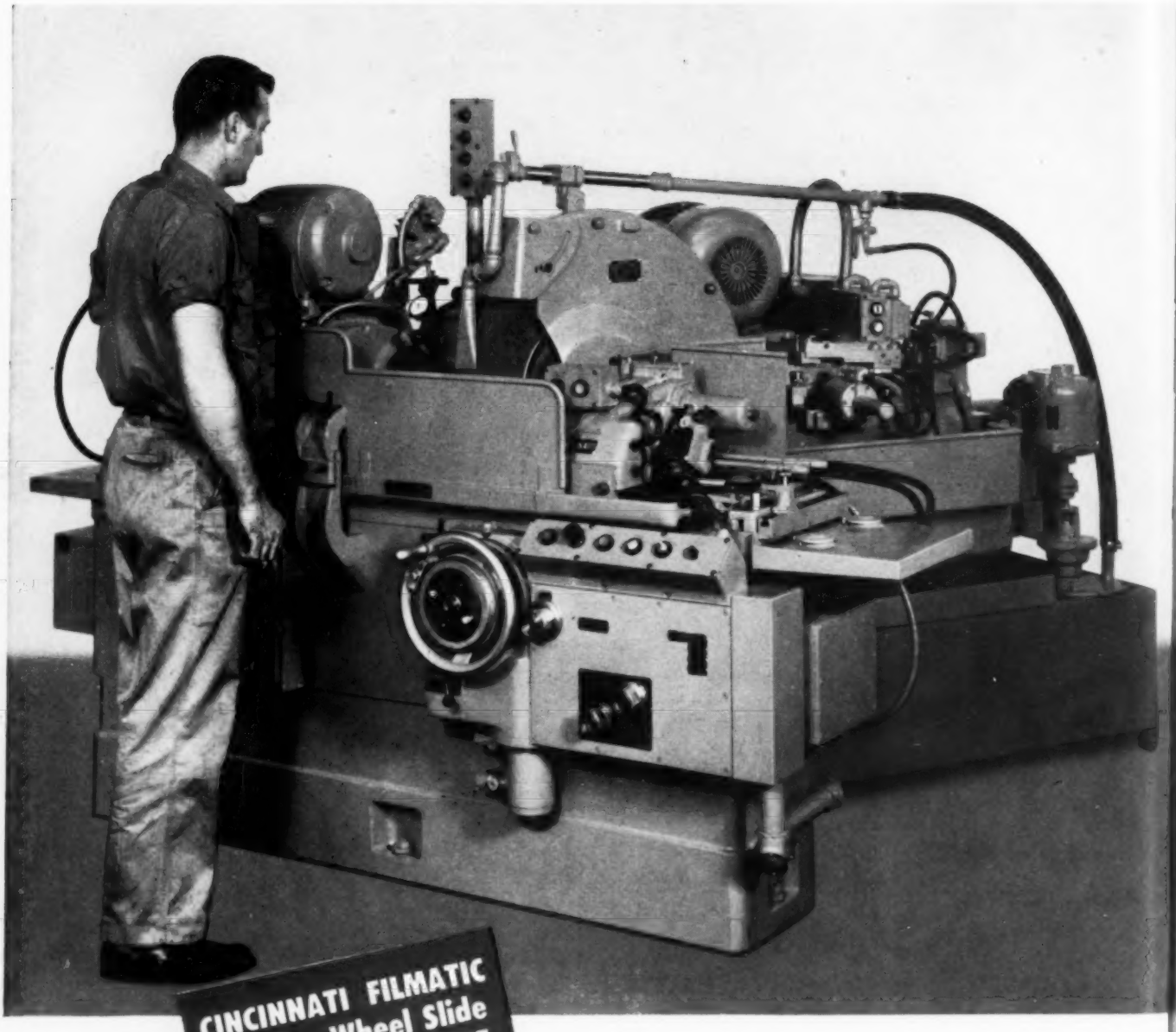
How Close Is Abrasive Grain Quality Control 51
Grading is critical for today's requirements. By B. P. Haire.

DEPARTMENTS

Letters 4
Industry Observer 8
Editor's Page 21
Grinding Safely 43
Free Literature 55
New Equipment and Materials 61
News of Industry 73
Index to Advertisers 79

COVER: SUPER BARREL FINISHER, built by General Motors Process Development Section for pre-plating polishing of die cast decorative trim, shuttles parts like these dashboard bezels through the process drum on continuous conveyor. Method replaces buffing for many parts. Story begins on page 23.

It Pays to Combine



CINCINNATI FILMATIC Angular Wheel Slide GRINDING MACHINE

Diameters and adjacent radii and shoulders are precision ground in one operation on this CINCINNATI FILMATIC 10"R x 18" Angular Wheel Slide Grinder. Sizes available: 6"R and 10"L x 18" or 30" between centers; 10"R and 14"L x 18" to 72" between centers.

CINCINNATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • ROLL GRINDING MACHINES • SURFACE GRIND

Precision Grinding Operations

Especially on a CINCINNATI Built for the Job

Time, effort and dollars are saved when operations are combined. And quite often quality improves, just as it does when diameters and adjacent radii and shoulders are ground in one operation on CINCINNATI® FILMATIC Angular Wheel Slide Grinding Machines. These fine precision grinders are built for high production work at the lowest cost of any equipment available today. Many features contribute to this outstanding performance. Four are illustrated at the right. Others include:

Push-button automatic grinding cycle, incorporating coarse and fine feed rates for maximum production and high-quality finish.

Roll-out cutting fluid tank. Cuts down service attention.

***Automatic air-electric gage sizing** with cycle time stabilizer. High degree of accuracy and compensation for wheel wear obtained automatically.

***Automatic gap eliminator.** A timesaver where stock allowance varies widely.

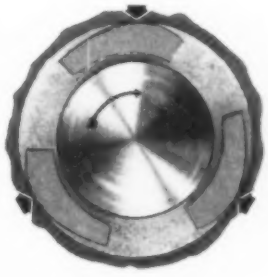
***Behind-the-wheel profile truing equipment,** for automatic, accurate profile truing in both directions.

Additional features and their advantages are illustrated and described in catalog No. G-686. Everyone concerned with modern precision grinding methods and low costs should have a copy. May we hear from you? Meanwhile you might want to look at the brief specifications in Sweet's.

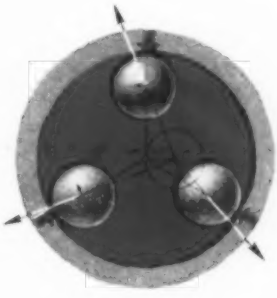
**Available at extra cost.*

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

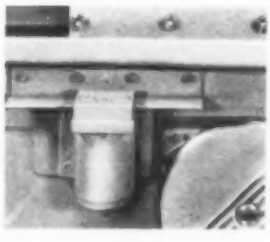
FILMATIC



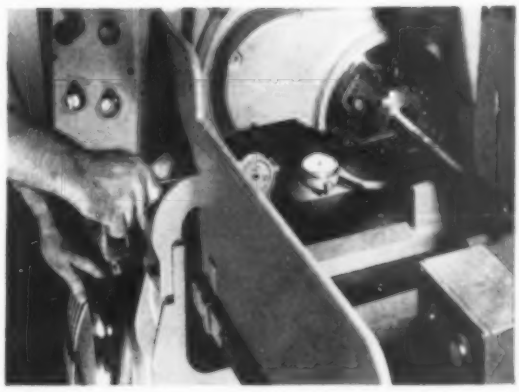
FILMATIC grinding wheel spindle bearings, exclusively CINCINNATI, have never been equalled by any other spindle bearing mounting.



Automatic grinding wheel balancing, an exclusive CINCINNATI feature, balances the wheel and mount within a few seconds.



Automatic hydraulic table clamp automatically locks the machine table in position during the grinding cycle.



Manual flagging device, for locating the work axially with respect to the wheels, is simple and accurate. Automatic flagging device is also available.

Letters to the Editor

High Power for Fast Grinding

We would like to compliment and thank you for the article, "High Power for Fast Grinding," appearing in the June issue of Grinding and Finishing. Installation of the machine is practically completed and late this week we hope to begin processing some of the orders that we have on our books.

Because many of our customers in the tool and die and rubber and plastic mold industries will be using this machine for some of their larger work, work that is too large for our 84" Blanchard machine, we believe . . . that it will not be necessary for us to plan an advertising program aimed at bringing work for it into our shop.

In the meantime, we would be delighted to have you visit us at your convenience. Our total plate operation is rather unique and now that we have this new machine the story is even more interesting and fascinating.

The story that you prepared for your magazine mentioned that we will grind steel members for our structural steel customers. This is in error since there is absolutely no necessity for grinding any part of a structural steel bridge or building job with the exception of small steel plates that are used for column base plates. The latter, we would grind on our small Blanchard machines.

Thanks again for a nice story and we are sure that the Mattison people must be pleased with it, too.

R. A. Kyle, Vice
President & Manager,
Steel Plate Division
The Burger Iron Co.

We have read with interest, your article on High Power for Fast Grinding in your June issue. We would be interested in further information on grinding machinery for heavy stock removal.

We saw an example of heavy grinding several years ago in Vermont on granite headstones. The cut was about 4" wide per pass, up to ½" deep, with a wheel about 2 feet in diameter, and feed speed a good walk. The cut was to contour the top of the stone. For coolant, a 1½" stream of water was used, but color showed at the contact point. No one we have since met who sells grinding wheels believes this, but we saw it. We keep needling these salesmen to come up with something comparable that we can use machining gray iron manhole frames and covers.

Francis LeBaron Jr.
Vice President
E. L. LeBaron
Foundry Co.

Lapping with Diamonds

Two of your items which you covered rather completely in the June issue are of special interest to us. These are the article on lapping with diamonds and the one on stainless steel finishing. Would it be possible for us to get eight copies of each of these?

For some time, now, we have noticed the editorials that you have and we find that they are both timely and instructive. Thank you for bringing these articles to the attention of so many people.

M. M. Maynes
Sales Engineer, Abrasives
Norton Company

Barrel Finishing at IBM

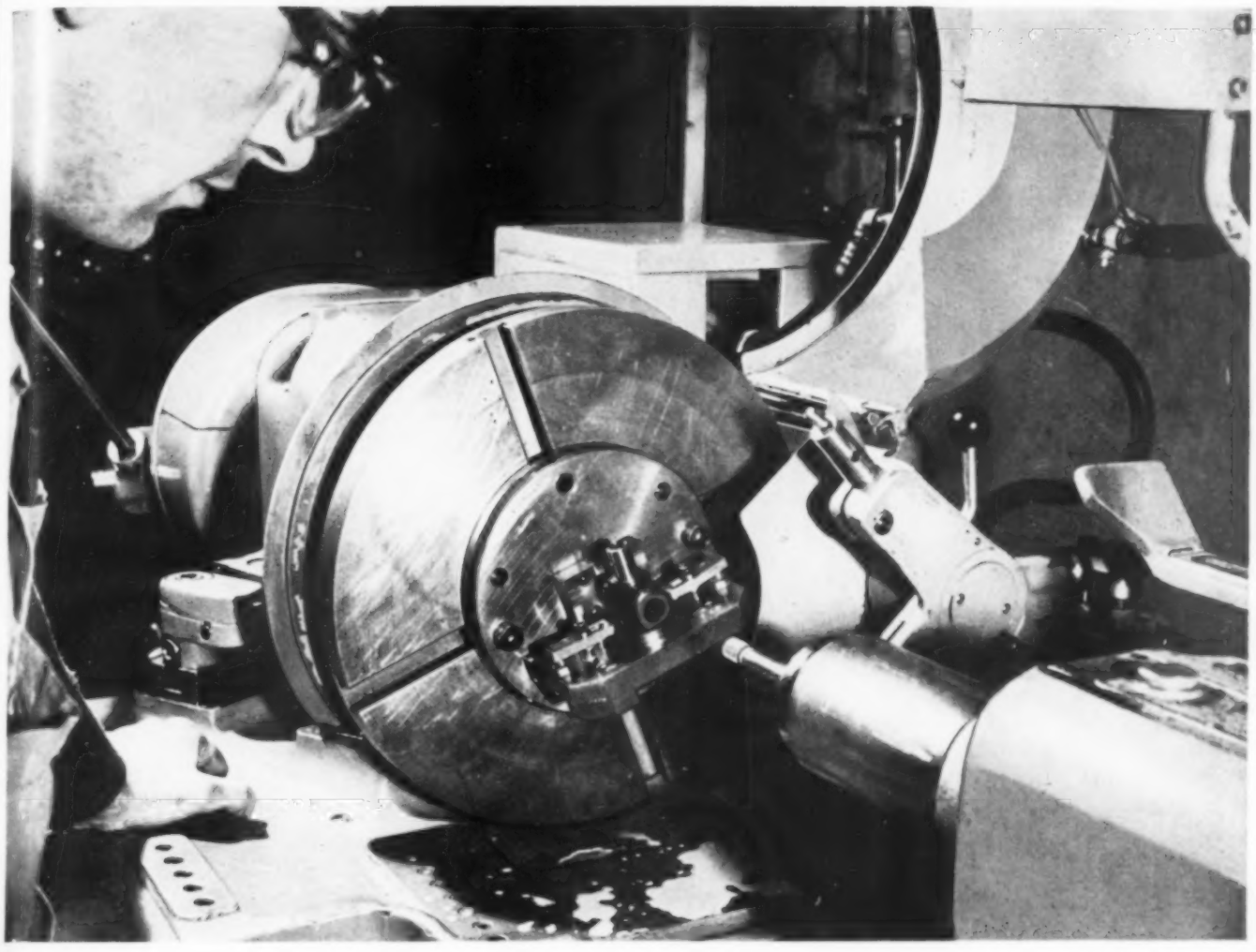
We are interested in your article "Automatic Barrel Finishing at I.B.M." by R. S. McFall, appearing in the May issue of "Grinding and Finishing", page No. 41.

We would appreciate it very much if you will send us six reprints of this article at your earliest convenience. Thank you.

J. Stanley Haering
Sales Engineer
Almco, Eastern Branch
Division of
Queen Stove Works, Inc.

Meet ERNEST F. HENNIS

. . . one of Bryant's internal grinding experts in the New York area. Like other Bryant representatives he knows grinding problems from "A to Z" and likes to solve them.



"Everything they claimed and then some..."

That's Mr. Gerald H. Buchholz talking. He's owner and manager of the Federal Tool and Instrument Company, Corona, New York, and he's talking about his No. 1116 Bryant Internal Grinder.

For more than two years now, Federal has been turning out close-tolerance work with a Bryant Grinder. Mr. Buchholz leaves no doubt as to its value: "It saves us both time and labor, and it holds tolerances better than any similar machine.

"Before our purchase of the 1116 we used an attachment on another machine for our fine work. But it was too slow for our production. We got the Bryant with an eye toward new business — and we got it!

"This machine has been everything the Bryant people claimed and then some. A man can ask no more than that."

See for yourself how a Bryant Internal Grinder can do better grinding *faster*. Ask for an immediate demonstration!

BRYANT Chucking Grinder Co.

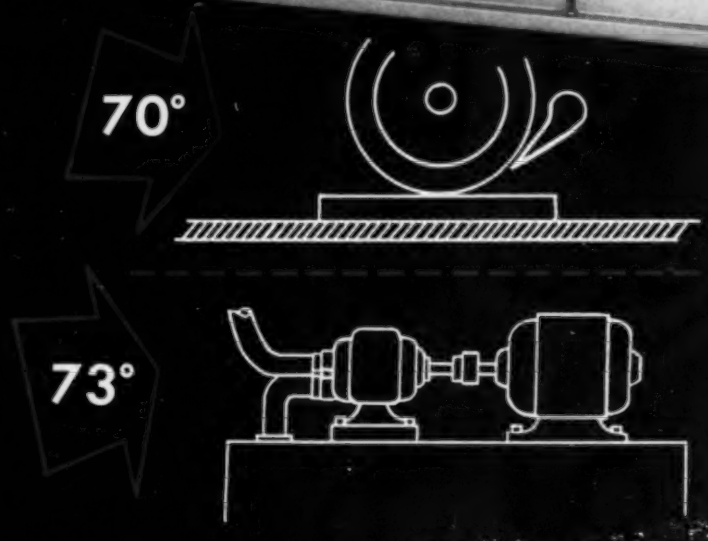
85 CLINTON STREET, SPRINGFIELD, VERMONT

Offices: Indianapolis • Cleveland • Chicago • Detroit • Mt. Vernon, N. Y. • Philadelphia

Internal Grinders • Internal & External Thread Gages • Granite Surface Plates • Magnetic Drums for Computers • Special Machinery

Use postpaid card. Circle No. 202

Thompson



Tests show *only a 3°* rise over ambient temperatures in the new Thompson Hydra-Cool hydraulic system after 24 hours' continuous operation. No machine distortion — no damage to hydraulic seals and valves.

Here's real news—the first major improvement in hydraulic surface grinding in the past 20 years.

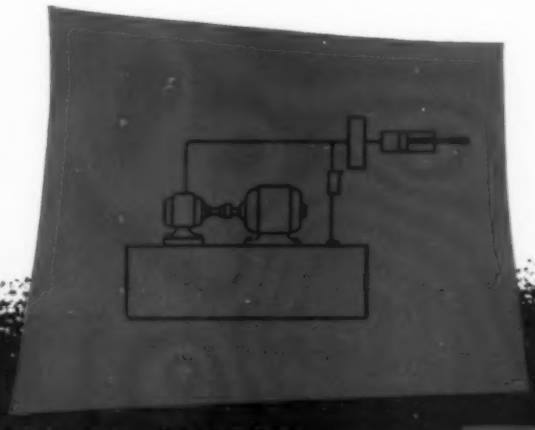
Heat, generated by continuous production grinding and constant hydraulic system operation, has long been a serious problem. General machine distortion, caused by extremes of temperature on top and bottom surfaces, has made close tolerances impossible to achieve. Excessive heat is destructive to the hydraulic system itself. Various and costly corrective measures have failed to solve this heat problem. Oil cooling and insulating devices have been only partially successful.

Now, the new Thompson Hydra-Cool system eliminates hydraulic heat *at its source*—with the new Thompsons, you hold your tolerances, no matter how close they may be or how long the run! Exhaustive tests have convincingly proved that, even after 24 hours of continuous operation, temperatures in the new Thompson Hydra-Cool hydraulic system have risen *only 3 degrees above ambient temperatures.*

To you, the new Thompson Hydra-Cool hydraulic system assures greater precision, less scrap loss, more trouble-free hydraulic operation—actual savings in dollars and cents! The new Hydra-Cool hydraulic system is available on all types of Thompson machines 40 inches and above in work length AT NO EXTRA CHARGE.

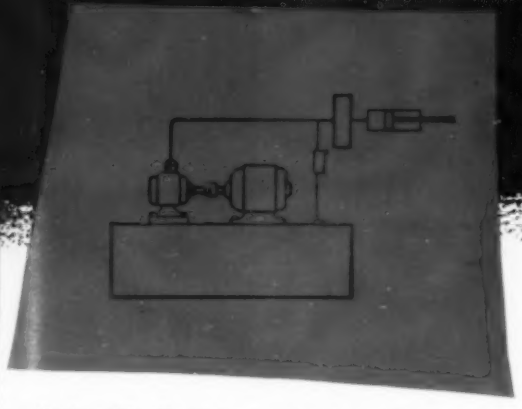
Again... THOMPSON LEADS IN SURFACE GRINDING ENGINEERING

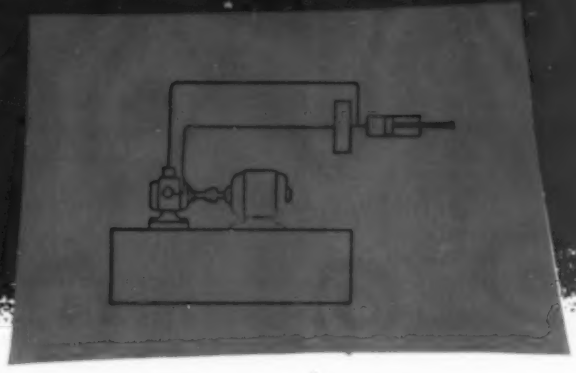
grinders eliminate hydraulic system heat



System No. 1—Constant volume hydraulic pump systems provide a continuous flow of oil for table reciprocation with pressures controlled by a relief valve set for greatest work need. Total pump volume circulates throughout the system continuously, generating heat even when the table is at rest. Oil coolers are a necessity on production work involving precision grinding.

WHICH TYPE OF SYSTEM WOULD YOU RECOMMEND?





System No. 2—Variable volume hydraulic systems regulate oil flow to the work requirement at adjustable rates, reducing oil flow through the system to only that volume necessary for each job. This limiting of flow through the system is an improvement over constant delivery systems but pressures within the system are still controlled by preset relief valve settings so that near constant pressures are maintained throughout the run. Oil coolers are also necessary for these systems.

The Thompson Hydra-Cool System*—New, pressure-compensating, variable delivery systems on new Thompson grinders control the rate of table movement and operating pressures automatically through a single hand lever control. As operator adjusts rate of table movement for the initial phase of each job, pressures within the system adjust automatically for the exact requirement to move the table smoothly and a constant speed. This modern pressure servo type system keeps HP input to the minimum. When the table is stopped, the pump ceases to pump oil. Hydraulic system heat remains at levels close to the ambient temperatures of the room. Distortion of the grinder bed is completely eliminated . . . at the source, without accessory cooling systems or expensive insulation methods. YOU GET THESE ADDED ADVANTAGES AT NO EXTRA COST.

*PATENT APPLIED FOR

MAIL THIS COUPON TODAY!

The Thompson Grinder Company **Springfield, Ohio, U. S. A.**

Please send me your free booklet giving important facts on the new Thompson Hydra-Cool Hydraulic System.

NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

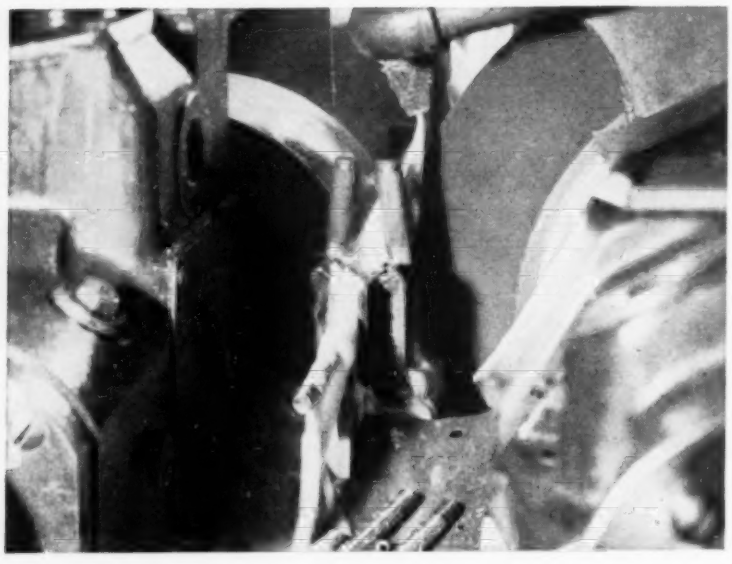
Thompson

SURFACE GRINDERS

Use postpaid card. Circle No. 203

Improved Lusol..

A BETTER PRODUCTION METHOD



Improved Lusol, an oil-free transparent water-soluble solution, will give superior performance in a wide variety of grinding operations. The combination of lubricity and maximum cooling make Lusol especially indicated for Centerless Grinders where a fine low micro inch finish is required.

PROOF THAT LUSOL MEANS LOWER COSTS— BETTER RESULTS

THE WORK: Grinding seals for jet engines on Heald Rotary Grinder. **MATERIAL:** Chrome and S.A.E. 8740 Stainless Steel. **CUTTING SPEED:** 1800 R.P.M. **DILUTION:** Lusol 30-1, former coolant 20-1. **COST PER GALLON IN MACHINE:** Lusol 6½¢, former coolant 8¢. **PIECES PER DRESSING:** Lusol, 20; former coolant 15. And Lusol made possible a 5 micro finish which could not be achieved with the former coolant.

THE Lusol.. LINE
BETTER PRODUCTS FOR BETTER METALWORKING

F. E. ANDERSON OIL COMPANY INC.

BOX 218, PORTLAND, CONNECTICUT

Use postpaid card. Circle No. 204

Industry Observer

Buick Motor Division, Flint, has installed dust collectors that recover as much as 25 per cent of the carats lost from diamond tool-grinding wheels. Buick's experience in World War II, paralleling that of many other companies, was that the supply of diamond grinding wheels became very short. During the Korean War, too, they had to wait 14 months for a particular wheel, and they're anxious not to have that situation happen again. The new collectors are an important phase of Buick's diamond conservation program.

A new surface grinder hydraulic system has been introduced by Thompson Grinder Company, Springfield, to prevent heat from building up and affecting close tolerance work. As we understand it the Hydra-Cool is a variable volume, pressure-compensating system with no external relief valves. It supplies just enough pressure to operate the machine functions, but without supplying excess pressure which builds up heat and tends to limit close tolerance grinding on the machine. More on this development next month.

The ASME June meeting in San Francisco discussed, among other things, the problems in designing, manufacturing and operating the Army's first nuclear power reactor, now in use at Fort Belvoir, Va. The APPR, a 2000-kw pressurized-water nuclear generating plant, presented its problems in that it must remain in service for 20 years, with minimum maintenance. Tricky machining problems were encountered on the reactors Stainless-clad carbon steel vessel.

82 technical and management papers presented at the 12th annual conference of the Reinforced Plastics Division of the Society of

(Continued page 12)

Service for you

PDQ

from your

SIMONDS INDUSTRIAL DISTRIBUTOR

Products Grinding wheels, mounted wheels, abrasive segments, abrasive grain . . . for efficient, low cost performance! *Your Simonds distributor is a "single" supply source for all.*

Deliveries Speedy supply from complete 'local' stocks. Instant net price quotation on any quantity of Simonds wheels. *Your Simonds distributor is as near as your phone.*

Quality Established, proven product quality! This is the basis on which your distributor selects all his stocks . . . and the reason why *your Simonds distributor offers you service that saves.*

SIMONDS ABRASIVE COMPANY

Tacony & Fraley Sts., Philadelphia 37, Pa.

DIVISION OF SIMONDS SAW AND STEEL CO.

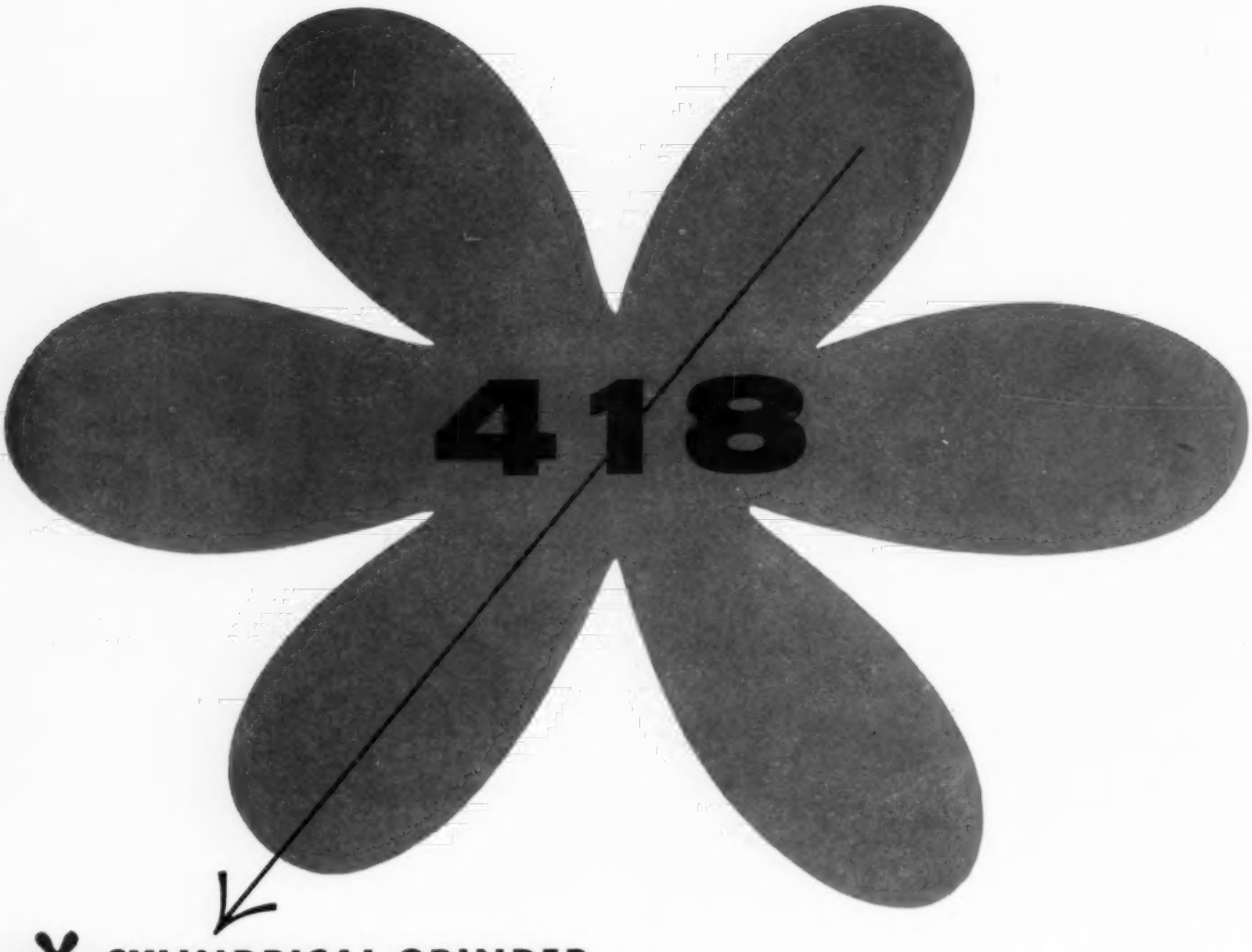
BRANCHES: PHILADELPHIA • CHICAGO • DETROIT • LOS ANGELES
SAN FRANCISCO • PORTLAND, ORE.

Use postpaid card. Circle No. 205

Get Accurate, Low-Cost

with a

VAN NORMAN



✱ CYLINDRICAL GRINDER

The Van Norman 418 Cylindrical Grinder is engineered to give you fast, accurate, low-cost plunge and traverse — small parts grinding, particularly if you have small or medium sized runs.

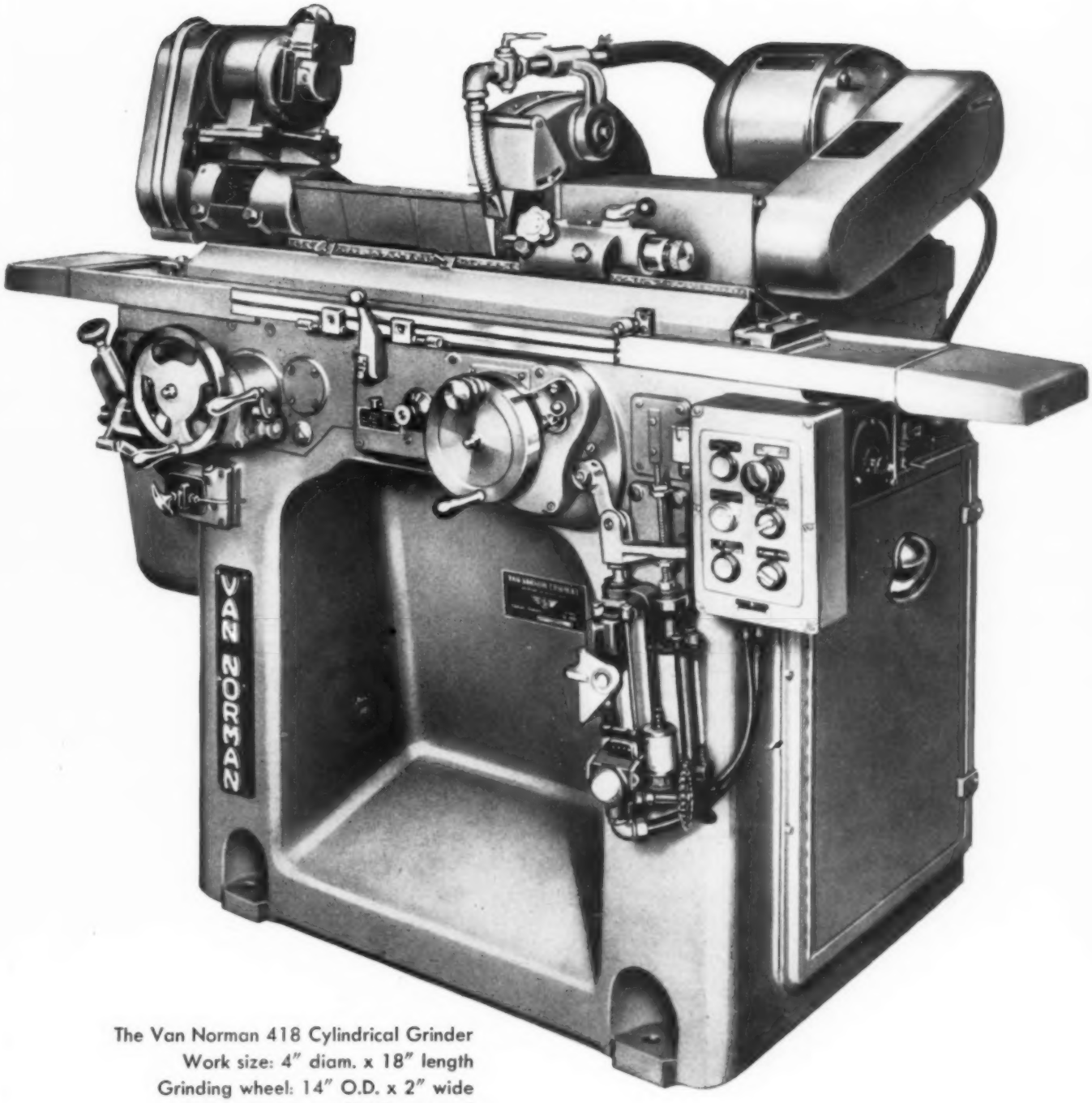
With the 418 you get big machine economy and performance at small machine cost. Setups are quick and easy . . . workpieces are easily loaded, ground and unloaded. Get full details on the Van Norman 418 . . . write, wire or phone now for complete specifications.

VAN NORMAN MACHINE

a division of Van Norman Industries, Inc.

MANUFACTURERS OF — Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.

Plunge and Traverse Grinding



The Van Norman 418 Cylindrical Grinder
Work size: 4" diam. x 18" length
Grinding wheel: 14" O.D. x 2" wide
2 HP wheel motor (3 HP optional)

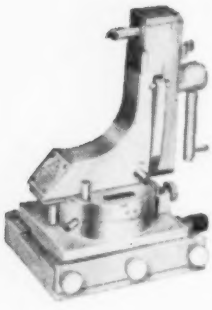
COMPANY

SPRINGFIELD 7, MASSACHUSETTS

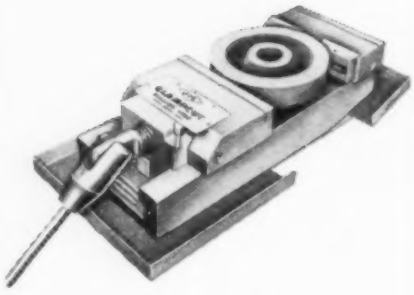
Don't wait . . . for extra profits install a Van Norman grinder now! They are available in many purchase plans . . . Outright sale . . . Purchase on conditional sales contract up to five years . . . Pay as you depreciate up to 10 years. Conditional Sales Contracts not available to Export.

Use postpaid card. Circle No. 206

J&S DOWN-HOLDING DEVICES and WHEEL DRESSERS LEAD THE FIELD

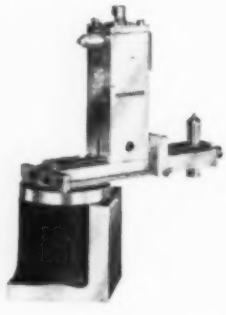


Fluidmotion Wheel Dressers—Dress two angles tangent to a radius, using ONE handle in one continuous motion. Operation is so fast and simple that beginners can use them. For all types cylindrical and surface grinders.



J & S Swivel Vise—The only hardened and ground swivel vise that mounts low, swivels, needs no pedestal. Patented down-holding clamping jaws give many times the holding power of an ordinary vise, yet only half the weight.

J & S All-Purpose Jaw Clamps — For any machine table or face plate. Five models—one adjusting screw has a holding force of 2½ tons on Small model, 12 tons on Jumbo model. Eliminate u-clamps, straps and fingers. No obstruction problems, no interference with measuring tool readings.



J & S Form-Master—Sturdy wheel dresser for shops with less frequent wheel dresser requirements. High quality, 100% dust-proof, it is capable of dressing any radii up to 12″ convex, up to 15″ concave.

Write for free literature and further information.

J&S TOOL CO. INC. — JAW CLAMPS • PRECISION VISES • DOWN-HOLDING DEVICES — **CLAMPCUT**

J & S TOOL CO., INC.
880 DORSA STREET
LIVINGSTON, NEW JERSEY

Use postpaid card. Circle No. 207

Industry Observer . . .

Plastics are contained in a 562-page preprint book offered at $7.00 plus postage. Information presented should be the latest in the use of plastics in all industrial fields, a real eye-opener. For copies of the book, address The Society of the Plastics Industry, Inc., 250 Park Ave., New York 17.

American business spends more on packaging than is spent on electric power for lighting, heating and powering industry's wheels. Just another reminder that the country can get terribly littered if we aren't careful where we throw all that packaging material.

Electro Refractories has introduced a new grinding wheel for roll grinding in steel mills that introduces a new concept for the operation. The new wheel is as thin as three inches, as opposed to the usual roll grinding wheel's four or five inches. Initial wheel cost is thus brought down 20 per cent or more, and the wheels are said to grind as many rolls as their wider predecessors. The wheels are said to help eliminate traverse marks and reduce drag between wheel and work.

Higher dollar volume of sales in the fourth quarter is expected by the majority of business men interviewed in a Dun & Bradstreet survey, but most of them expected the increase to be due to higher prices, rather than expansion in unit volume. Manufacturers of nondurable goods, of whom 61 per cent expected increased sales, were more optimistic than businessmen in other lines.

Our exclusive story on the unique wheelslide of the Bryant Centalign internal grinder beginning on page 30 should be of interest to production men. The story was triggered by our managing editor's seeing the diagram on page 30 while chatting with one of Bryant's district sales managers, and was prepared with Bryant's cooperation. It explains the heart of the machine's construction and operation.

"What a difference CDP* makes"

Over and over we hear this from people after they try (and then standardize on) KOEBEL CDP* dressing tools for grinders.

CDP* tools are different—IN ECONOMY

- you use up every point and piece of every diamond particle.
- there is no wastage. CDP* gives the most efficient use of diamond caratage conceivable.
- you eliminate diamond resetting.
- you get more pieces per dressing.
- longer wheel life cuts wheel costs.
- you cut diamond tool costs (see example).

CDP* tools are different—IN PERFORMANCE

- there's a big difference in results (see typical example).
- they even do jobs big single diamonds can't do efficiently.
- they take the guesswork out of diamond performance by insuring *uniform* results, tool after tool.

Yes, CDP* tools are different

- there is no quality variation in CDP* dressing tools.
- it is their design and manufacturing uniformity that gives you such uniform results.

* CDP

CDP*- Cemented diamond particles—small diamond particles set into a matrix which automatically adjusts itself to diamond wear.

A typical wheel dressing example

	Single Diamond	CDP* Dresser
Life	5 days	60 days
pcs/dressing	12	25
cost/100 pcs.	1.7 cents	0.5 cents

(¼ the tool cost per piece, half the wheel cost, less downtime and double the wheel life.)

CDP* tools

take the guesswork out of diamond tools and convert them into WORKHORSES OF INDUSTRY. What carbides did for machining, CDP* tools are now doing for grinding.

Ask for Bulletin #356

KOEBEL DIAMOND TOOL CO.

9456 GRINNELL • DETROIT 13, MICHIGAN

CDP DRESSING TOOLS—SINGLE & MULTIPLE DIAMOND DRESSING TOOLS—CDP CUTTERS

Use postpaid card. Circle No. 208

PERFORMANCE REPORT:

Blanchard No. 18 surface grinders have a long history of outstanding performance. They're economical, extremely accurate and highly productive on a wide variety of jobs.

V-490

STANDARD STEEL WORKS DIVISION
BALDWIN-LIMA-HAMILTON CORPORATION
BURNHAM, MIFFLIN COUNTY, PA.

November 26, 1956

Machinery Associates, Inc.
325 E. Lancaster Avenue
Wynnewood, Pa.

Attention: Mr. C. Dunsom Day, Vice President

OUR PURCHASE ORDER 8701-4576
YOUR ORDER M2-1-809

Gentlemen:

In response to your letter of October 12, 1956 relative to the No. 18 Blanchard High Power Vertical Surface Grinder which you furnished to us on the above order, I wish to advise that this machine has been entirely satisfactory. The machine was purchased primarily for grinding form and hollow bore cutters for our machine shops and the machine was installed in our Small Tool Department. We estimate that the savings which we have already experienced will allow us to amortize the machine in a period of approximately one year. Since the work load on cutters alone kept the machine busy only approximately one-third of the time, we have been able to do additional grinding which was formerly done on other machines and have been able to realize the same economies as we did on the grinding of the cutters.

Yours very truly,

W. H. Shiesler, Jr.
Chief Engineer

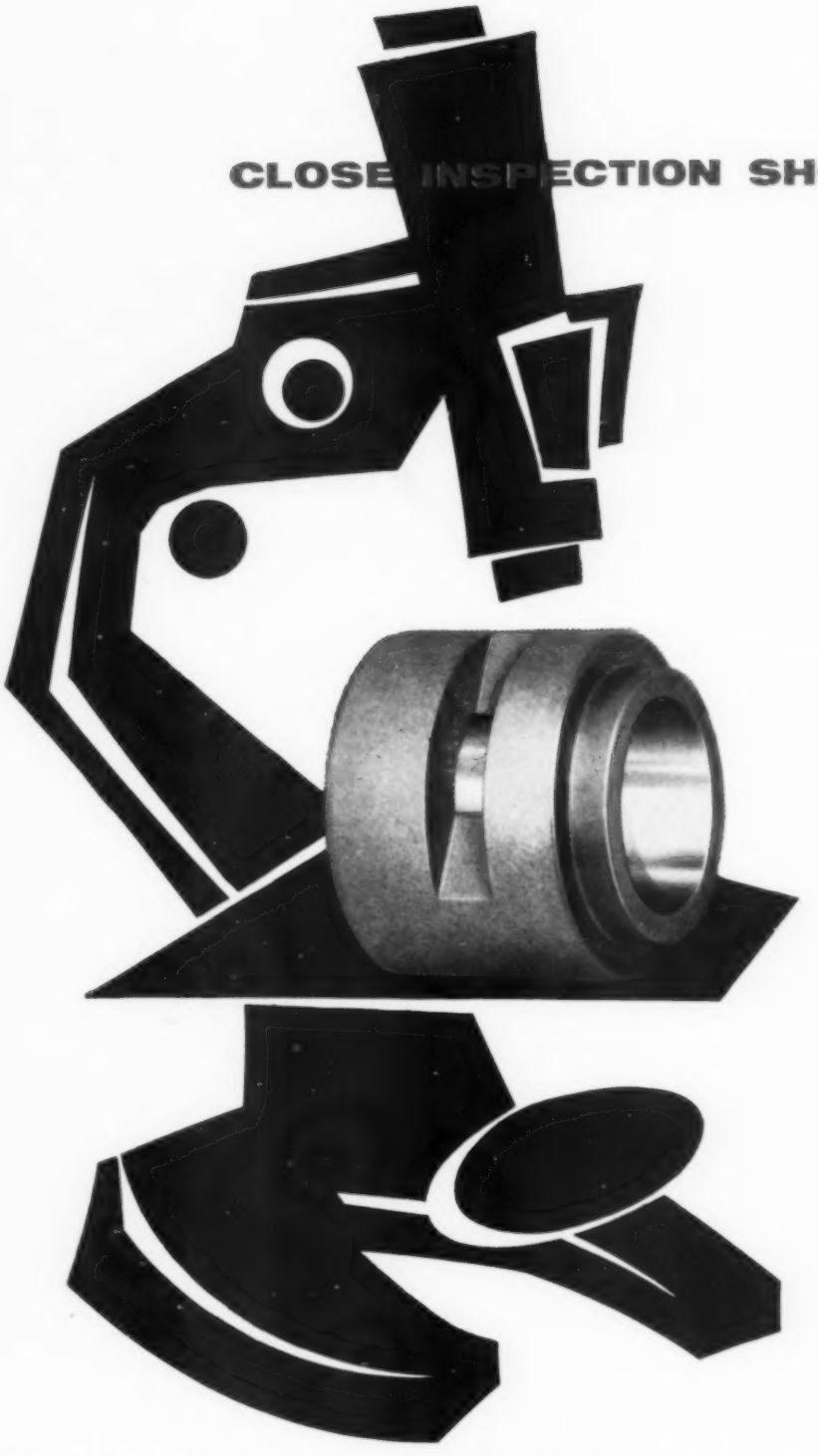
PUT IT ON THE BLANCHARD

Send today for your free copies of "Work done on the Blanchard", fifth edition, and "The Art of Blanchard Surface Grinding", third edition.

THE BLANCHARD MACHINE COMPANY
64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

Use postpaid card. Circle No. 209

CLOSE INSPECTION SHOWS...



only four-dimensional honed holes

MEET TODAY'S PRECISION TOLERANCES

All precision hole work you produce *must* meet close tolerance specs on the FOUR DIMENSIONS if the part is to give good service on today's precision equipment.

The Sunnen Honing Machine will produce bores that "measure up" on ALL FOUR DIMENSIONS:

ROUNDNESS—It guarantees geometrically round holes—corrects any pattern caused by chucking, heat-treat or previous operations . . . with minimum stock removal.

STRAIGHTNESS—It levels all internal irregularities for end-to-end precision—corrects taper, waviness, bow, hourglass and barrel shapes.

DIAMETER—Precision sizing is quick and economical . . . with production tolerances down to .0001" . . . to as close as .000025" if needed.

SURFACE FINISH—It produces any finish required—as fine as 2 micro-inches RMS in hardened steel . . . no heat checks or smear metal.

GET ALL THE FACTS ON SUNNEN HONING

send for five informative booklets

SUNNEN® PRODUCTS COMPANY

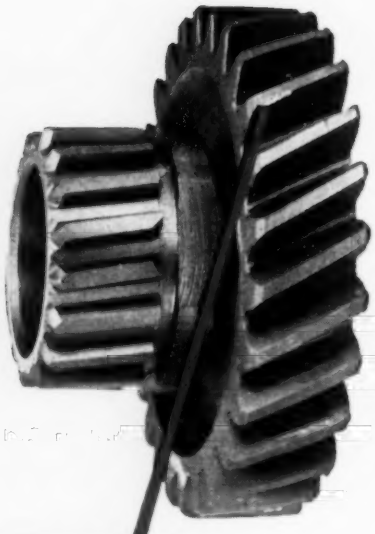
HONING

7921-H Manchester Ave. • St. Louis 17, Mo.

7377

Use postpaid card. Circle No. 210

RED RING
HARD GEAR HONING
PRODUCES QUIET GEARS



Nicked Gear Tooth

Same Gear Tooth After Honing

Hard gear tooth honing is an entirely new approach to the vexing problem of intolerable gear noise arising from nicks, burrs, tooth roughness and minor heat-treat distortions.

Honing is not only far more effective than other processes used to combat gear noise but it is also much more economical. And it produces none of the undesirable after effects inherent in other processes such as heat checks, soft skin or residual stresses in the tooth metal.

Gear honing does four important things:

- Smooths off the swaged or raised metal surrounding tooth nicks.
- Eliminates burrs.
- Materially improves surface finish.
- Corrects minor heat-treat distortions in profile, index and lead.

When used as a final routine finishing operation following heat-treat, it eliminates the tedious and costly operation of searching for nicks and then correcting them. It improves the quality, uniformity and performance of all gears produced.

SPUR AND HELICAL GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING
AND ELLIPTOID TOOTH FORM

NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN • DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

Patents pending

7631

Use postpaid card. Circle No. 211

A big step forward in barrel finishing

Improved ALUNDUM TUMBLEX* "A" abrasive brings you many new "Touch of Gold" advantages*

The new Norton TUMBLEX "A" abrasive has exceptionally long life . . . great resistance to wedging in work-piece crevices . . . adds attractive lustre . . . and can handle the widest variety of parts.

It performs several operations at once — removing flash, scale, tool marks and burrs, while forming radii and finishes to the required microinch.

It is also better sized, more uniform in shape and available in a wider range of sizes.

SIZES NOW AVAILABLE

No.	Size	No.	Size
00	1½" to 2"	3½	5/16" to 3/8"
0	1" to 1½"	4	1/32" to 5/16"
1	3/8" to 1 1/16"	5	3/16" to 1/4"
1½	1 3/16" to 3/8"	6	1/8" to 3/16"
2	5/16" to 3/4"	8	1/32" to 1/8"
2½	1/2" to 5/16"	10	standard 10 mesh
3	3/8" to 1/2"	12	standard 12 mesh

Every one of these sizes has the advantages that will increase the value of your finished parts and cut the costs of your general barrel finishing. That's how improved TUMBLEX "A" *abrasive will step up your profit-boosting "Touch of Gold" to a new high.*

Send Your Work Samples

to our enlarged Sample Processing Department — and include a finished piece. We will barrel finish the samples with new TUMBLEX "A" abrasive — or any other Norton tumbling abrasive that may be more suitable — and return full information telling you exactly how you can improve product quality and cut finishing time and costs. NORTON COMPANY, *General Offices,* Worcester 6, Mass. Plants and distributors around the world.

G-330

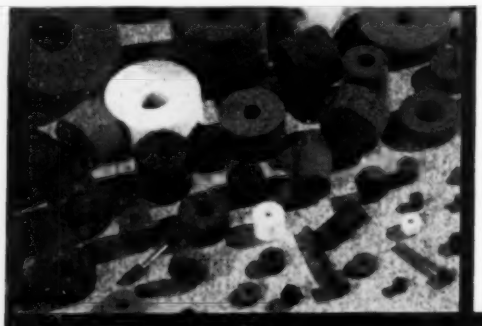
NORTON
ABRASIVES

Making better products . . . to make your products better

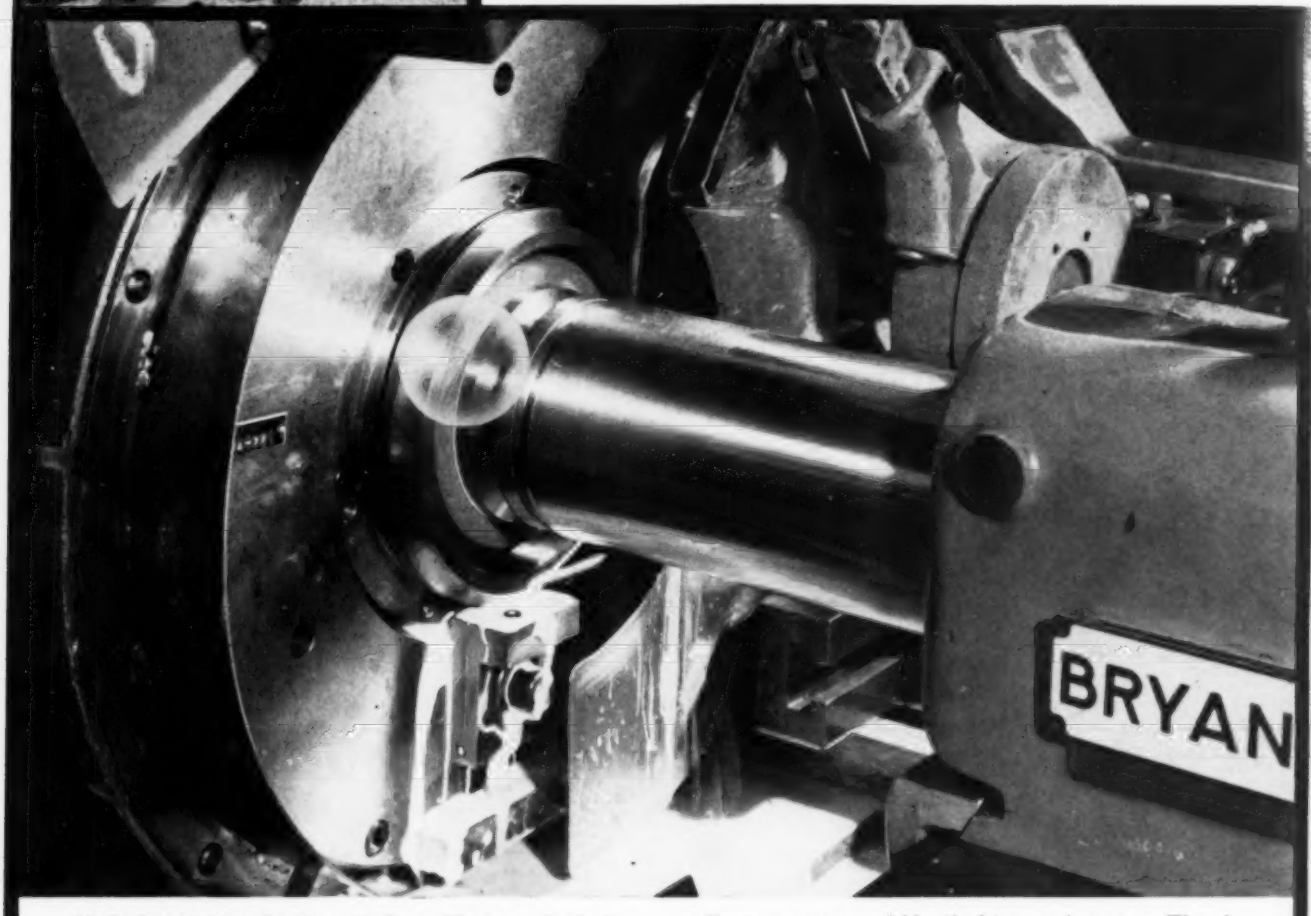
NORTON PRODUCTS:
Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING DIVISION:
Coated Abrasives • Sharpening Stones • Behr-cat Tapes

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

Use postpaid card. Circle No. A1



Best for every



High Production At Lowest Cost. Norton wheels for internal grinding are precision-processed for completely uniform structure and identical top performance. There's no fussing with timing cycles when you change wheels.

Norton wheels — with different abrasives, different bonds — spread the "Touch of Gold" across the entire internal grinding range

You can step up your production rate on internal grinding jobs by choosing exactly the right Norton I.D. grinding wheel you need. And you'll add the "Touch of Gold" to your product quality as well as quantity — because you have the widest possible choice.

For high production grinding, 44 ALUNDUM*, 57 ALUNDUM, 19 ALUNDUM and regular ALUNDUM abrasives are all quality abrasives at non-premium prices. In particular, the new 44 ALUNDUM wheels with G Bond have earned high praise from users in many different types of applications. For example:

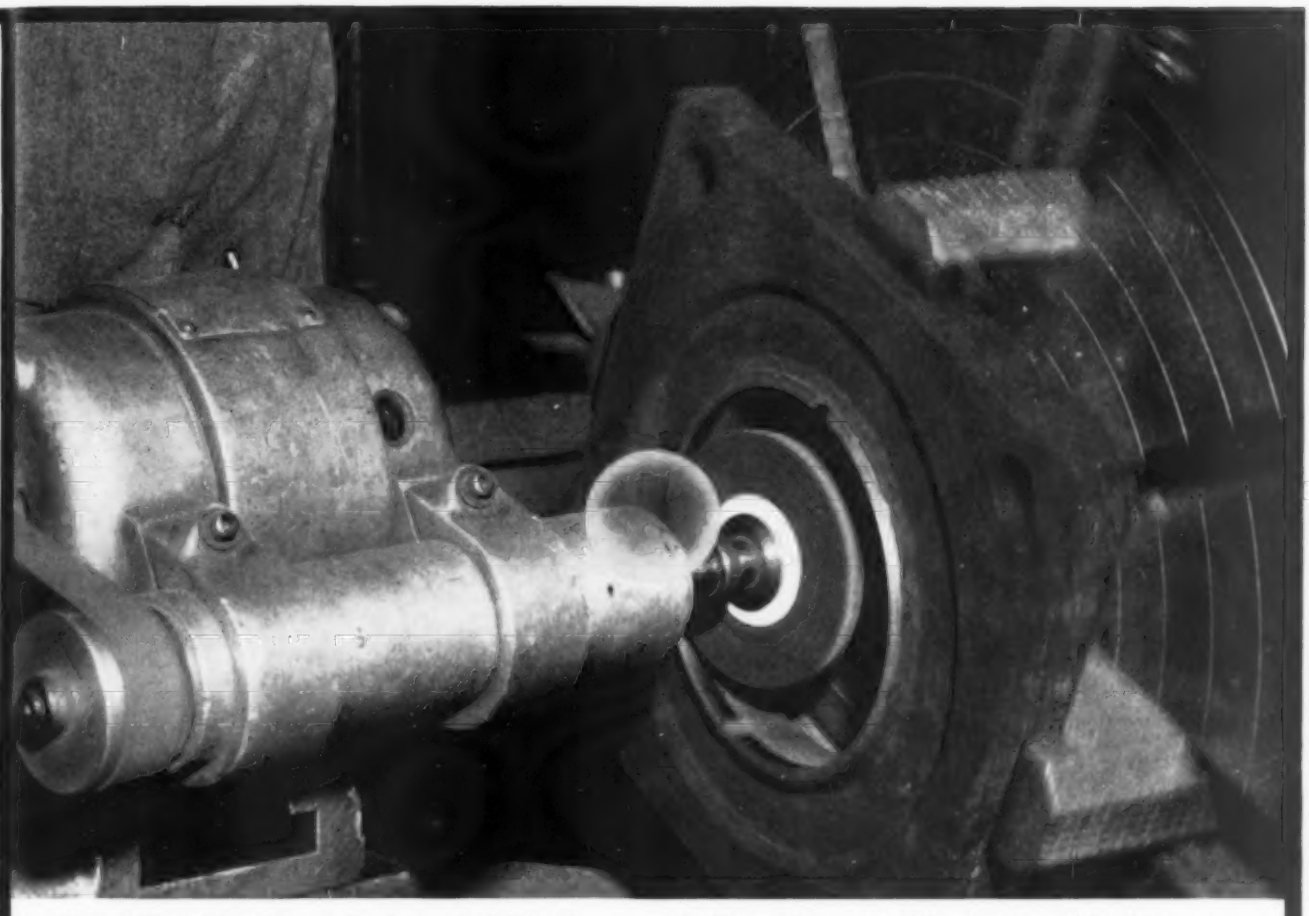
A Michigan customer, using 44 ALUNDUM wheels for I.D. grinding heavy duty hardened steel bushings, reports: *Breakdown was very even, with less glazing, excellent cutting action, and half the dressings needed by standard wheels. "44's" were the best ever used.*

From a New Jersey user the report on internal grinding of small steel gears is: *The "44's" are great for grinding sharp radii, with 30% more pieces per dressing and per wheel, and finish improved from 28 to 15 r.m.s.*

In a California plant, doing all kinds of internal grinding the details are: *Best all-around wheels ever used. Top performance on stainless steel, cutting exceptionally fast without excessive breakdown.*

A Pennsylvania customer, internal grinding steel gear housings, says "44's" are: *Freer cutting wheels that hold*

I.D. grinding job you do



Money-Saving Precision In Toolroom And Miscellaneous Internal Grinding is assured by the completeness of the Norton line — the right abrasive and bond for every type of job on every type of grinder.

W-1819

form better, require less dressing and greatly improve finish.

Whichever of these abrasives you use, team it up with the Norton G Bond, the most efficient vitrified bond ever developed for accurate production grinding.

When your I.D. grinding is the toolroom type, choose 38 ALUNDUM or 32 ALUNDUM abrasive — the latter especially for the more-difficult-to-grind steels because of its outstanding ability to penetrate and hold the cut. And with these two famous abrasives, select G or BE bonds — both vitrified.

Your Norton Distributor will gladly arrange a test of these "Touch of Gold" wheels in your plant. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors all around the world.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NORTON

ABRASIVES

Making better products... to make your products better

NORTON PRODUCTS

Abrasives • Grinding Wheels • Grinding Machines • Refractories

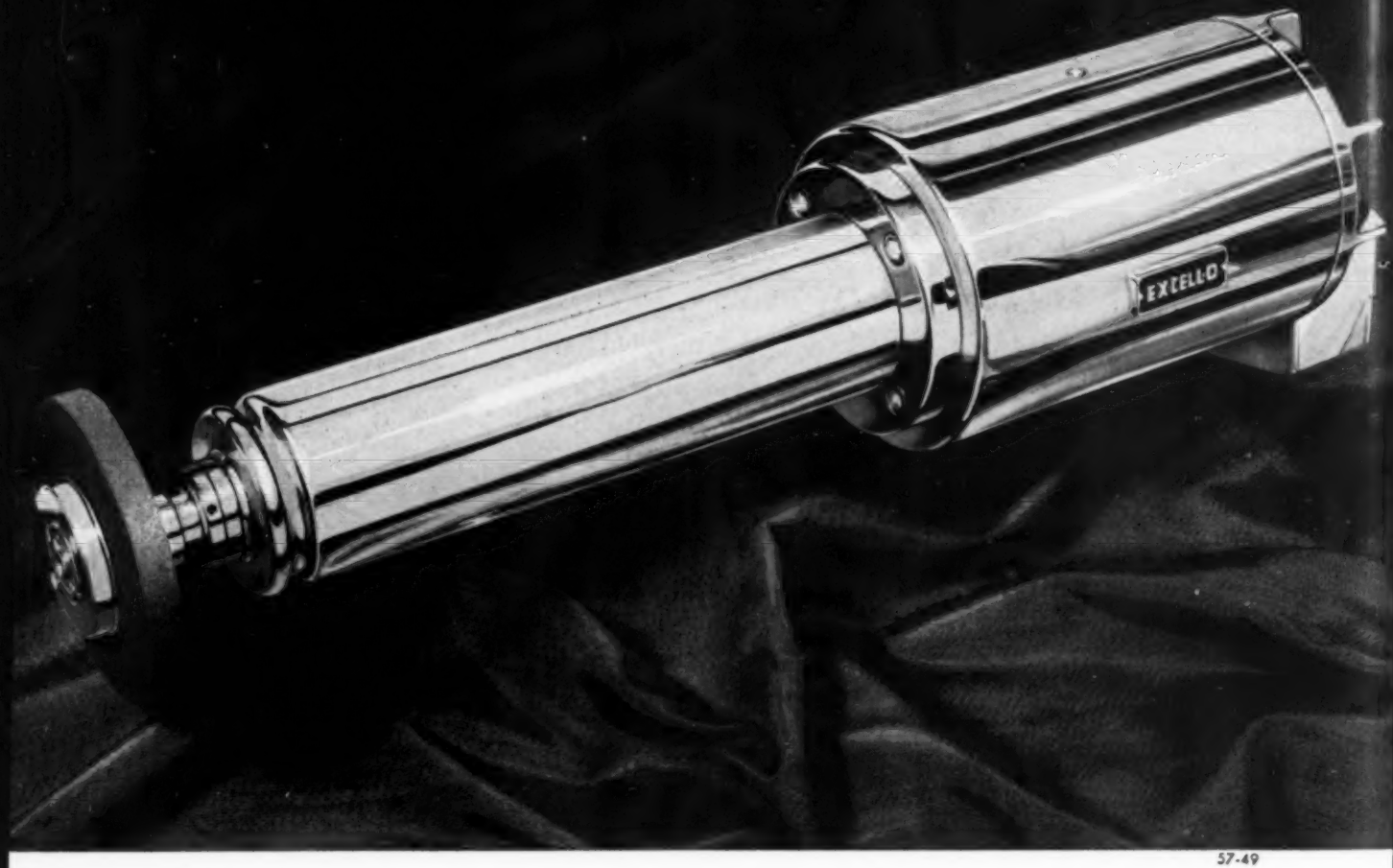
BEHR-MANNING DIVISION:

Coated Abrasives • Sharpening Stones • Behr-cat Tapes

Use postpaid card. Circle No. A-2

16c

#100,000



57-49

Proof of Precision: This 100,000th Spindle

. . . that's right. Ex-Cell-O has produced more than 100,000 precision grinding and boring spindles. They are in use today throughout the world, on a wide variety of important jobs. No other spindle manufacturer has so solid a record for satisfaction—so sound a reputation for building the best.

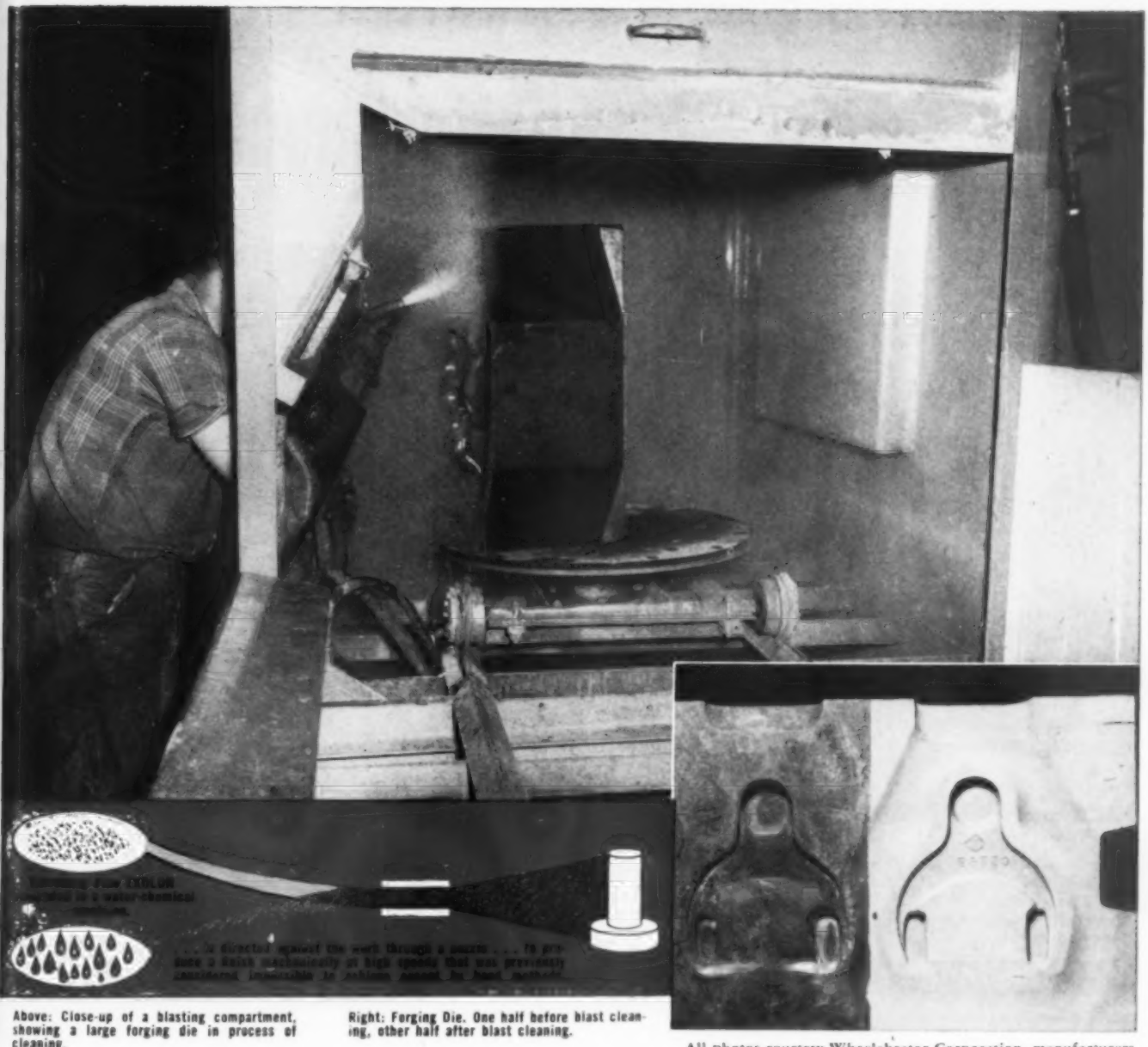
EX-CELL-O FOR PRECISION XLO

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

Machinery Division

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • TORQUE ACTUATORS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

Use postpaid card. Circle No. A3



Above: Close-up of a blasting compartment, showing a large forging die in process of cleaning.

Right: Forging Die. One half before blast cleaning, other half after blast cleaning.

All photos courtesy Wheelabrator Corporation, manufacturers of LIQUAMATTE Wet Blasting Equipment.

Wet blasting with EXOLON *FASTBLAST* reduces costly hand finishing time 97 to 99%

EXOLON (aluminum oxide) abrasive in particles so small they can be suspended in a slurry, are thrown at high speed against the work to be finished. Scales, burrs, carbons, oxides and smeared metal are removed, exposing the virgin metal in a minute, non-directional matte finish.

The rate of finish is controlled by varying air pressure; abrasive size, type and concentration; blast angle and distance of nozzle from work. The abrasive mesh sizes usually are 150, 180, 220 and 240.

Wet blasting produces a chemically clean surface to which plating and other coatings adhere in a permanent bond. Hand finishing requiring 1 to 6 hours was reduced to 30 seconds to 10 minutes by Wet Blasting.

Our technical and research staff will be glad to assist on any problems in the use of EXOLON or CARBOLON.

The EXOLON Company

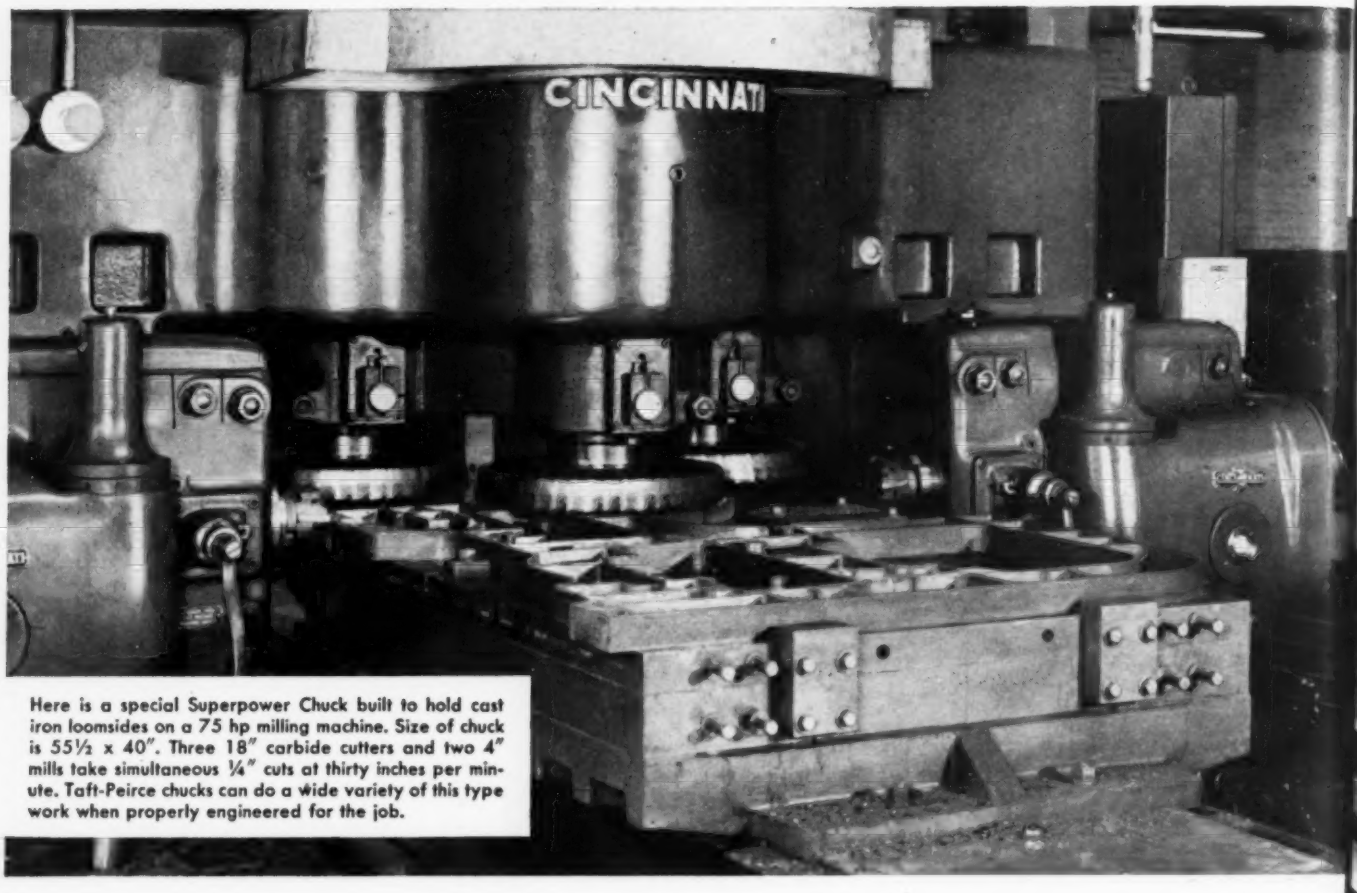
1002 East Niagara Street • Tonawanda, N. Y.

Thorold, Ontario, Canada

Manufacturers of SILICON CARBIDE and ALUMINUM OXIDE ABRASIVES

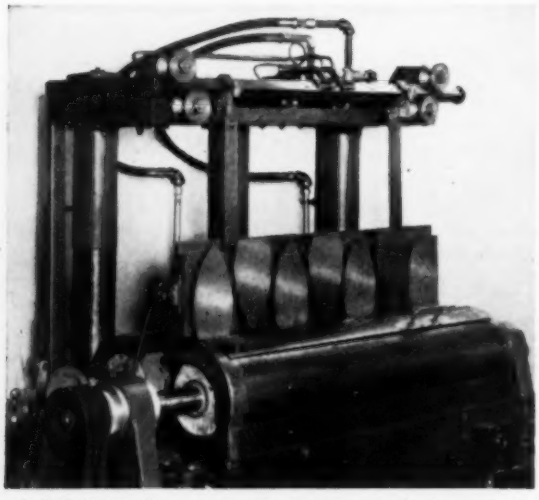
Use postpaid card. Circle No. 212

Taft-Peirce Magnetic Chucks bring



Here is a special Superpower Chuck built to hold cast iron loomsides on a 75 hp milling machine. Size of chuck is 55½ x 40". Three 18" carbide cutters and two 4" mills take simultaneous ¼" cuts at thirty inches per minute. Taft-Peirce chucks can do a wide variety of this type work when properly engineered for the job.

Simplicity, flexibility make Superpower Chucks Versatile "Handymen" in milling, shaping, profiling, layout, inspection and holding odd-shaped work



A Taft-Peirce Superpower Electromagnetic chuck was artfully applied to put flat iron bases through a glazing machine. Both sides of the chuck are loaded, holding fourteen pieces at once — a greatly simplified arrangement.

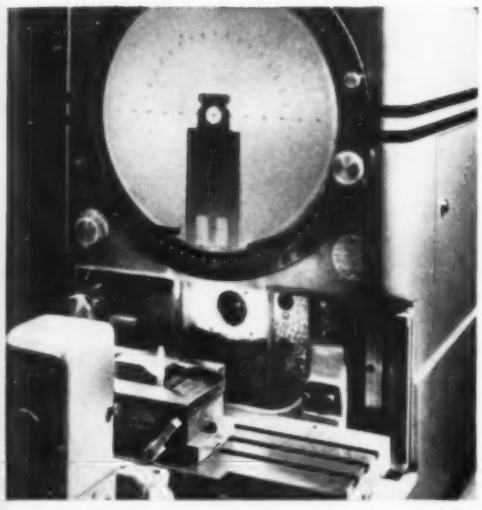
The art of magnetics is making magnetic chuck-held machining and inspection a new and intriguing source of cost and time savings throughout the plant.

To give you every possible opportunity to make use of these advances, Taft-Peirce offers the most complete line of magnetic chucks, work drivers and accessories available today. Here are just a few of the features you will find in the Superpower line . . .

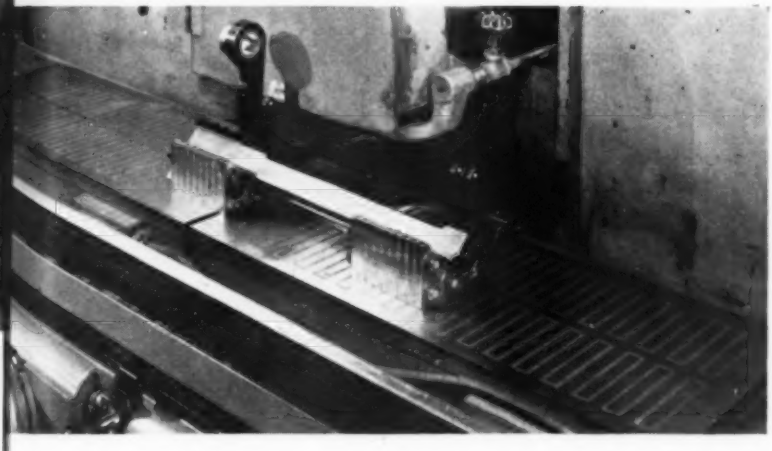
- Choice of Permanent or Electromagnetic types — allows complete freedom of selection for every application.
- Maximum useable power — scientific concentration of magnetic forces, more magnetic poles.
- Low heights, light weight — more working room, easier to use and handle.
- Extreme precision — rugged construction, skillful manufacture and careful assembly.

Look at Taft-Peirce Magnetic Chucks as a versatile device. The photographs here cover just a few of the many possibilities which you can use to develop new ideas. Special chucks for unusual holding applications are designed and built on order; and help in adaptation of standard sizes and types will be expertly provided. Write for Catalog No. 412 — a comprehensive story of magnetic chucking with data on complete Taft-Peirce line.

New Cost Savings to Workholding



A clever inspector is using this combination of a Taft-Peirce Permanent Magnet Chuck and Magnetic Parallel to hold parts for optical gaging. Chuck accuracy assures precision, and minimum residual magnetism allows rapid on-off handling.

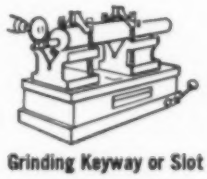


Two 12" x 36" Superpower Magnetic Chucks are tandem mounted and used in conjunction with magnetic V-Blocks to handle this piece on a 72" surface grinder.

Grinding simple and compound angles becomes very easy and precise when you use Taft-Peirce Magnetic Angle Plates. This compound angle is being ground on a No. 9866-2.

Tips

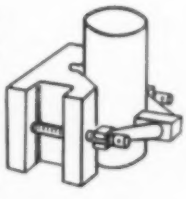
and IDEAS on MAGNETIC CHUCKING



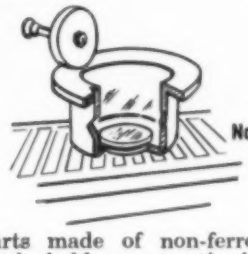
Grinding Keyway or Slot

Here is an easy method to grind a keyway or slot, particularly on irregular or odd-shaped workpieces. Use Superpower chuck as base, set up work on standard V Blocks and grind as required. Will hold to precision tolerances.

This adjustable dummy arrangement is a convenient way to set wheel height for finishing to a given dimension. Mount dummy in V Block, clamp it to required height and apply layout dye. Touch wheel to top of dummy.



Adjustable Dummy or Size Block



Holding Non-Ferrous Parts

Parts made of non-ferrous material can be held on magnetic chucks by utilizing apertures or openings where the workpiece will be resting on chuck faceplate. Steel slugs inserted through these holes will give firm holding power for most grinding operations.

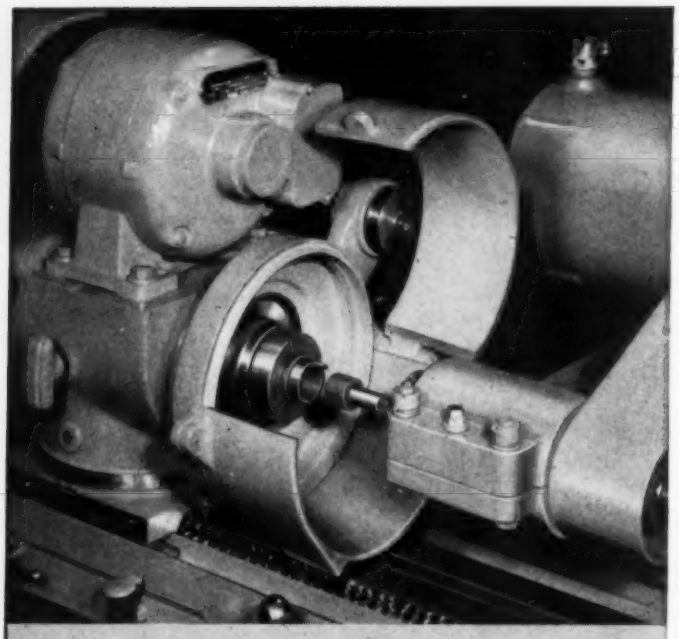
T P

TAKE IT TO TAFT-PEIRCE

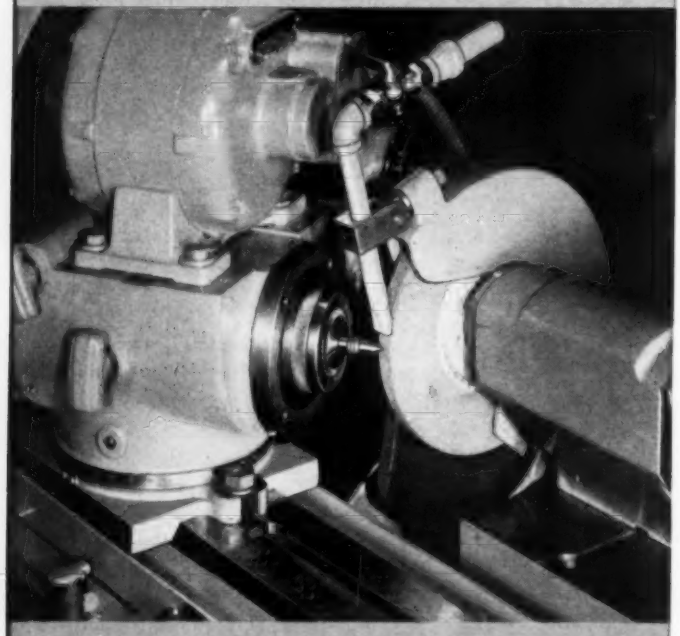
THE TAFT-PEIRCE MANUFACTURING CO.
WOONSOCKET, R. I.

T-P Means TOP Precision

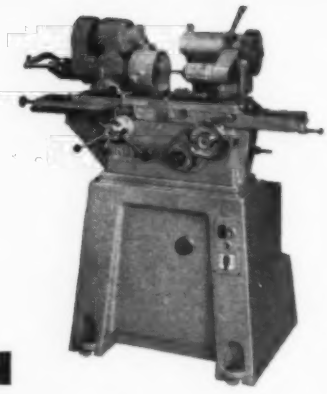
Use postpaid card. Circle No. 213



Grinding a straight hole with the work held in a step chuck.



Grinding sharp taper on metering needle held in collet with workhead swiveled 30°.



AN INTERNAL SPECIALIST WITH EXTERNAL ABILITY!

Rivett Model 84. The New Small Hole Grinder With The Greatest Popularity Gain!

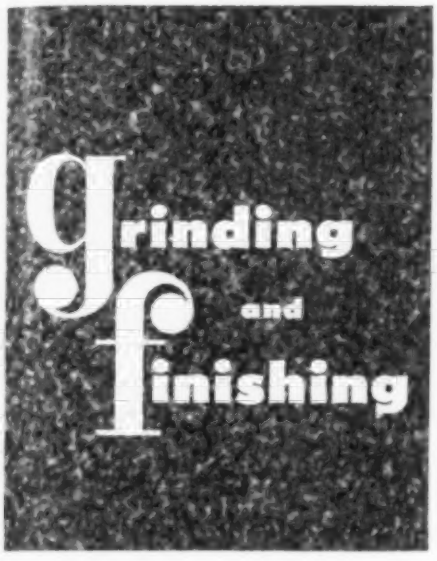
Combines inherent accuracy with broad flexibility for faster handling of your diversified jobs. Mounts interchangeable wheelheads for internal and external spindles. Hole and external capacities are 3″ diameters, maximum depth 4″. Collets and step chucks mount directly in lathe-type spindle.

All details to prove are in Catalog 84A. Write for your copy today!

RIVETT LATHE & GRINDER, INC.
DEPT. GF 8
Brighton 35, Boston, Mass.

RIVETT
INTERNAL & EXTERNAL GRINDERS

Use postpaid card. Circle No. 214



Editor's Page

Help at Your Elbow

One of the things about our American economy that constantly amazes us in the technical publishing business is the speed with which an engineer can get competent help with his technical problems. In reviewing the many questions submitted to our readers service department we're reminded about the vital part this instant availability of know-how plays in keeping industry rolling, as we've seen the answers to some pretty ticklish processing problems located and sent out promptly.

To be sure, the solution of most of these problems involves the purchase of a product or service. Thus it entails providing a profit for somebody else. But that's the basic strength of our economy—that it provides an atmosphere of competition in which companies that consistently come up with the answers deserve and get a profitable chunk of business out of the deal.

This was a concept that was pretty well impressed on some of us in our engineering training—that there was no use trying to know all the answers. Today's problems are too complex, and their quick solution too important, for the individual engineer to attempt to solve them all. Asking for a technician or engineer with all the answers in this age of progress is like asking for the moon. But thanks to the telephone, the answers needn't be any farther away than our elbow.

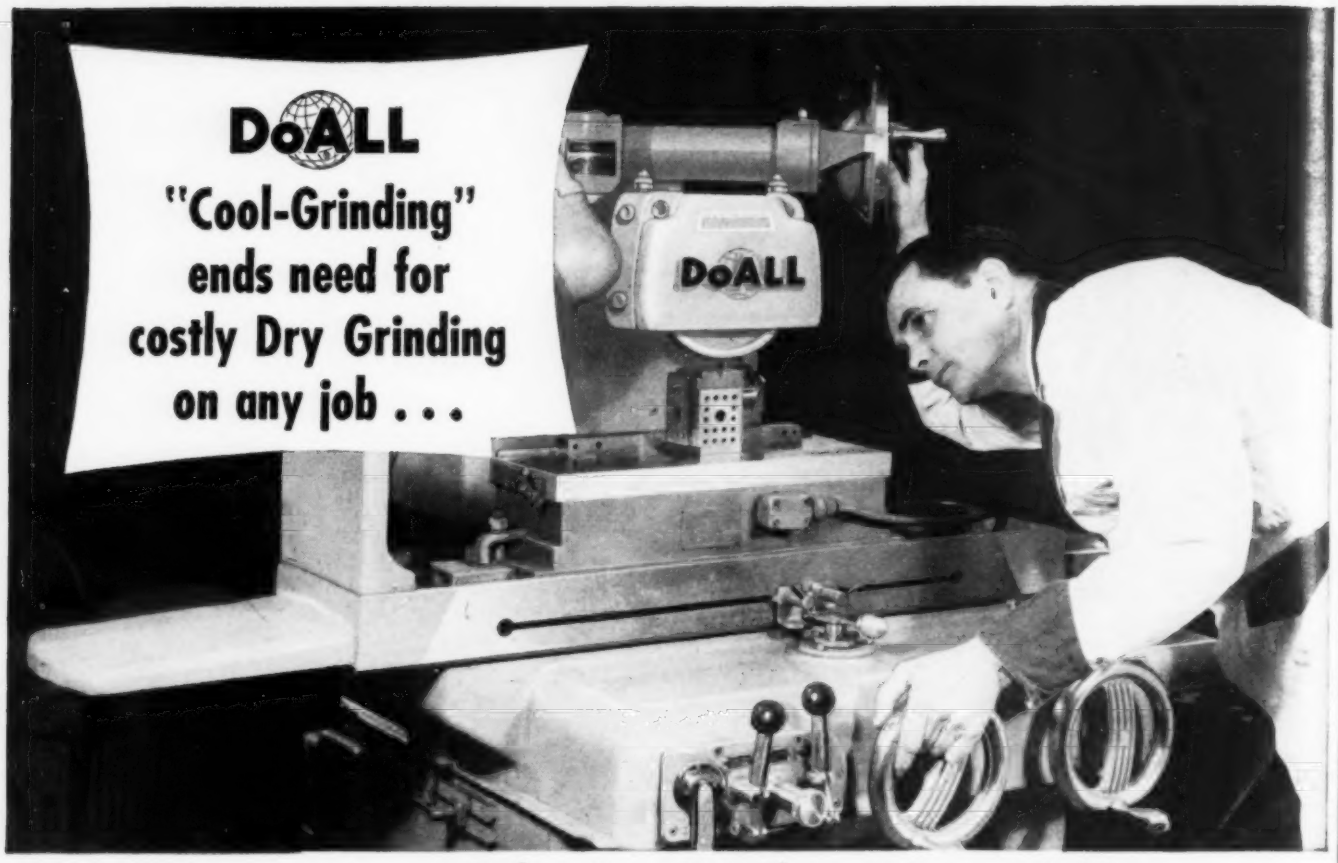
As long as our industrial economy remains competitive and healthy, we needn't fear the expansion of a "second-best" industrial nation like the USSR. Our American system itself tends to strengthen our ability to meet and solve complex technological problems because of its competitive nature. But a system like Russia's tends only to bog down an engineer in bureaucratic problems. It's interesting to note that the Soviets have had to artificially introduce stimulants to individual initiative to get their technical personnel on the ball and insure progress. It just proved that to dangle something nebulous like the "good of society" in front of an ambitious engineer isn't enough, but that he must be offered personal reward that he can feel. Which our system does provide in abundance.

When you stop and think about the free dissemination of technical information in this country—through the technical press, through professional societies and that competent technical help is literally no further from us than our elbow, you'll have to agree that ours is an amazing economy. Let's not trade it for a second-rate system.

Jack Kenyon
Managing Editor

DoALL

"Cool-Grinding" ends need for costly Dry Grinding on any job . . .



"Cool-Grinding" Attachment for DoALL Precision Surface Grinders

Coolant is fed to the sides of the wheel. Centrifugal action pulls it **through** the wheel and out at the periphery in a fine mist. This keeps the workpiece from overheating at the point of cut where the heat is generated. Flood cooling is also provided but can be shut off when work visibility is paramount.

SEND FOR CATALOG

. . . contains complete description of "Cool-Grinding" and all models of DoALL Precision Surface Grinders.

ASK FOR FREE DEMONSTRATION AT YOUR PLANT

You can see "Cool-Grinding" in action right in your own plant on a DoALL mobile demonstration unit. Ask your DoALL demonstration specialist to call—there is no obligation.

Coolant Does Not Obstruct Operator's View . . . User Ups Production 250%, Wheel Life 350%

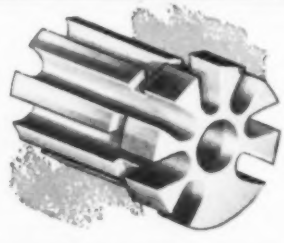
In DoALL "Cool-Grinding", coolant is introduced into the sides of the wheel and flows out in a mist at point of cut. There is no heavy coolant stream and no coolant nozzle to obstruct the operator's view of the work. Hence, the only reason for ever employing costly dry grinding is eliminated.

Here is how Milwaukee Precision Grinding Corporation, Milwaukee, Wis., gained by switching from dry grinding to DoALL "Cool-Grinding" on the intricate and difficult job pictured:

1. **Burning and warpage of work eliminated**—formerly, losses were excessive.
2. **Finish improved**—a harder, finer grit wheel can now be used.
3. **Production increased 250%**—they now do in two days what formerly took a week.
4. **Wheel life increased 300% to 400%**—costly wheel dressing taking 1½ hours now done ¼ as often and fewer wheels consumed.

Before "Cool-Grinding" was used, this job was a headache nobody wanted. Milwaukee Precision Grinding took it as a challenge . . . and found the answer.

Do you have toolroom or production line jobs you are grinding dry because the operators have to *see* the work?



THE JOB NOBODY WANTED—grinding the slots in this cavity die insert used in molding plastic sockets for TV tubes. ⅝ of the weight of the piece is removed by grinding. A headache with dry grinding, "Cool-Grinding" made it routine.

Then, find out about DoALL Precision Surface Grinders with the "Cool-Grinding" attachment. You can use coolant without obstructing visibility, increase your production and cut your costs.

Call your local DoALL Store or write:

The DoALL Company
Des Plaines, Illinois

Friendly DoALL Sales-Service Stores in 38 Cities

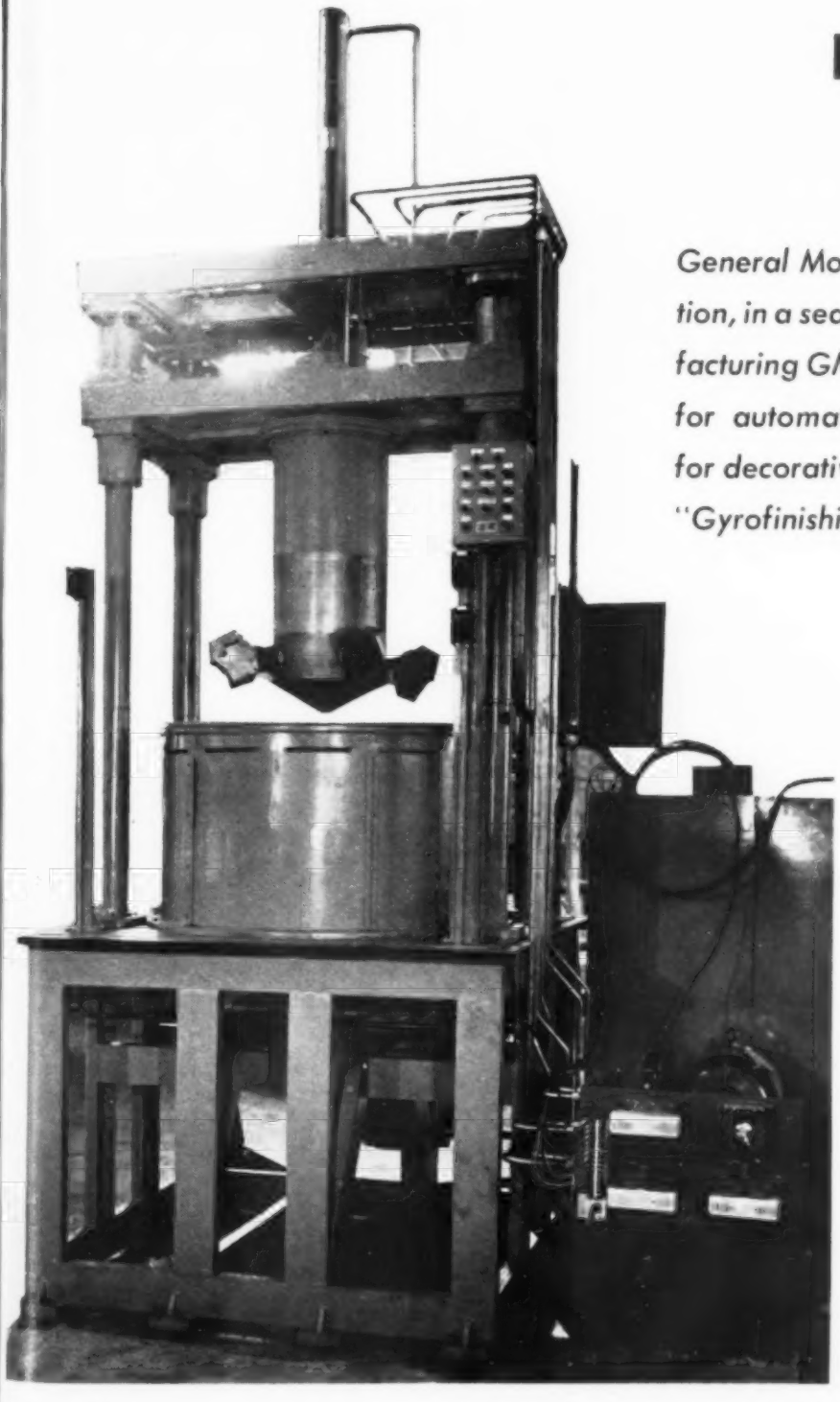
Cool Grinding U.S. Pat. No. 2470350

THIS IS A TYPICAL DoALL STORE

Use postpaid card. Circle No. 215

Grinding and Finishing
AUGUST, 1957

GM Designs A Finishing Machine



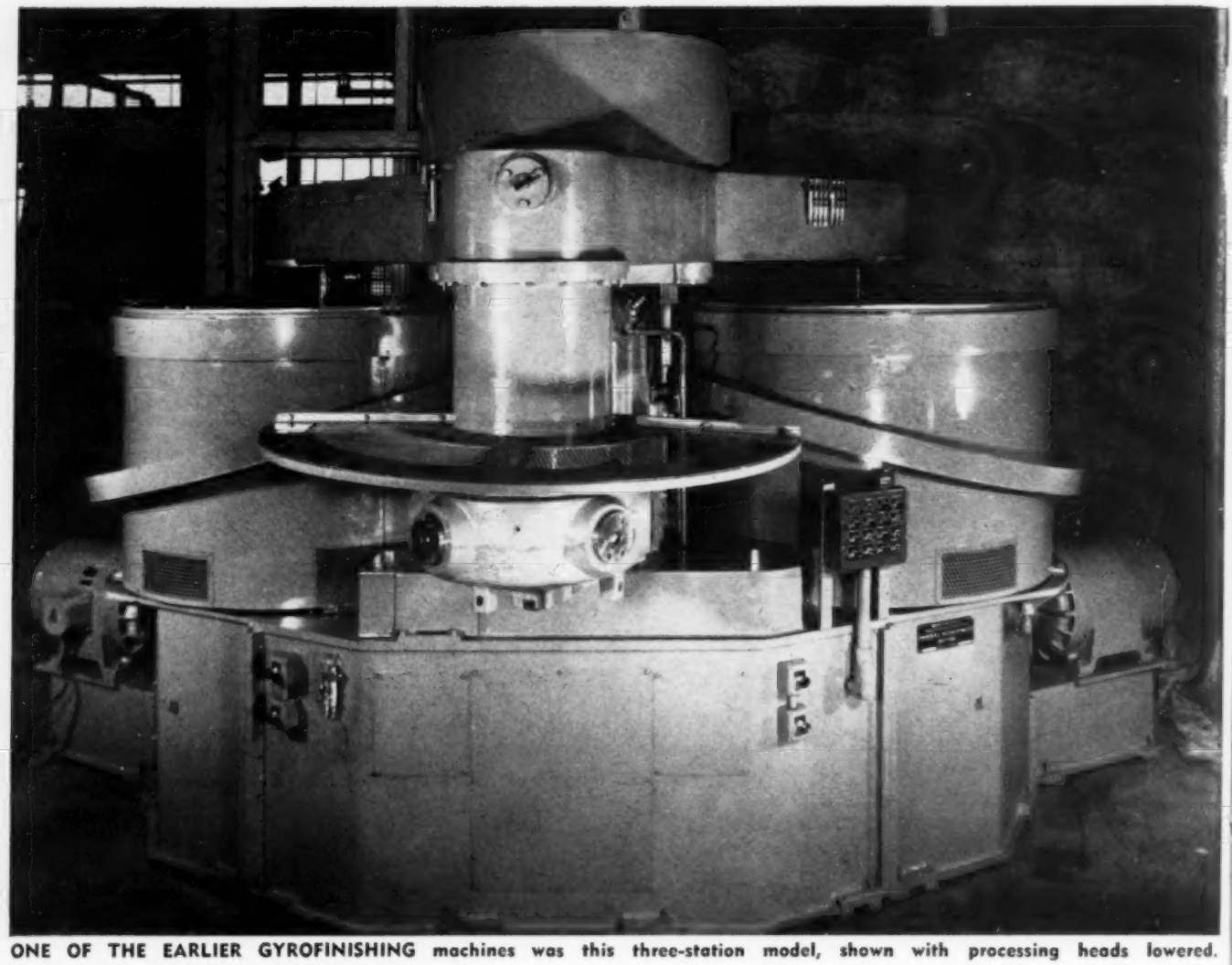
General Motors' Process Development Section, in a search for better methods of manufacturing GM products, designed a machine for automatic polishing of die cast parts for decorative plating. This process is called "Gyrofinishing."

By **Jack Kenyon,** managing editor, as told by **F. H. Williams, G. R. Squibb,** and **F. T. Hall** of the General Motors Process Development Section.

● By submerging parts to be finished in a revolving mass of fine abrasive material, General Motors' "Gyrofinishing" process has considerably speeded the pre-plating polishing of automotive trim parts.

Gyrofinishing grew out of a Process Development Section study of barrel finishing methods, in which one of the fundamental objectives was reduction in cycle time required to finish zinc die castings used extensively in automotive and household appliance trim.

When GM engineers observed the cascading action of material and parts in the barrel, the idea occurred that cycle time might be shortened if the relative speed be-



ONE OF THE EARLIER GYROFINISHING machines was this three-station model, shown with processing heads lowered.

GM Designs A Finishing Machine . . .

tween parts and abrasive media could be increased. But it was found that when barrel speed was increased to accomplish this, the barrel contents packed themselves against the sides of the barrel because of centrifugal force, and relative motion ceased. It was evident that the parts would have to be "plowed" through the abrasive in some way if high relative motion was to be accomplished.

A simple experimental machine was devised to try out the idea. It consisted of a tub rotating about a vertical axis. A shaft was installed so that one end would be submerged in the revolving bed of abrasive. A crank handle on the other end of the shaft gave a means of orienting the part with respect to the abrasive stream. Automobile window regulator handles, a common part which had to be finished, were selected as the first test specimens. They were of small size, irregular shape, and a high volume production part.

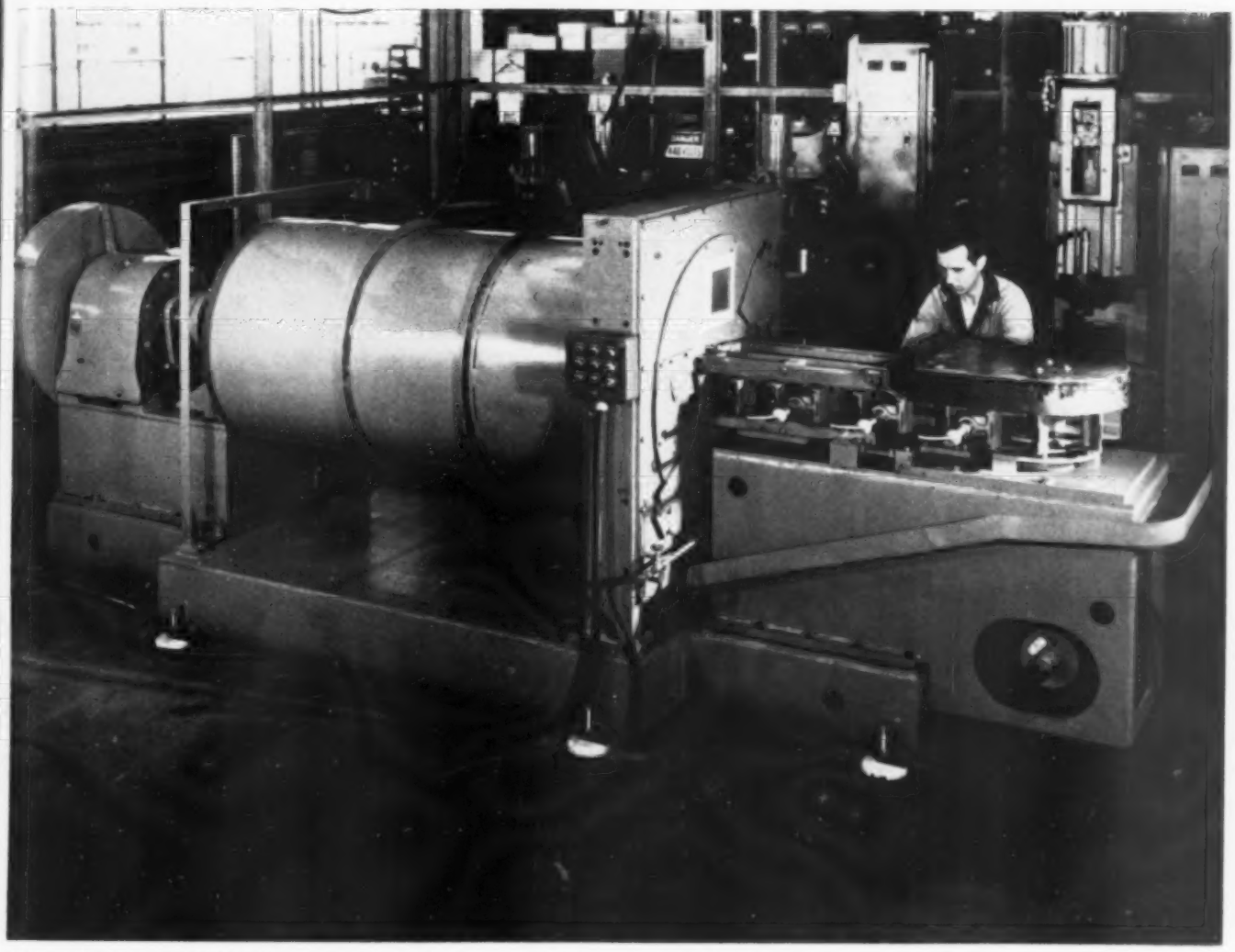
Standard barrel finishing chips were found to have a tendency to pack, and their abrasive action was too harsh. It was decided to go to finer abrasives, in a slurry mixture. The first tests proved the soundness of the basic idea—that finishing could be speeded by this means. The method came to be known as Gyrofinishing.

Another avenue of approach to the same problem was tried: rotating the part itself through a stationary tub of abrasive which was varied from a dry to a wet state. A single spindle drill press was employed for this test, in which process time was more than tripled in comparison with the revolving-barrel method. The increased time was attributed to reduction in density of the abrasive material. When the drum is revolved, centrifugal force in effect increases the density of the abrasive mass.

When the practicability of the basic idea had been demonstrated, patents were searched to avoid possible infringements. It was found that the principle had been patented in the last century in connection with the finishing of scissors' handles, but no recorded successes of the method were found.

A larger experimental machine was constructed to facilitate the further study of Gyrofinishing, using larger parts. With the machine, it was proved that steel parts as well as zinc-alloy die castings could be finished by the method. Bumper guards were successfully polished, using harder and more aggressive abrasives. Other materials tried with success were aluminum, brass, and stainless steel.

Success of the general concept has led to the building of a suc-



HORIZONTAL GYROFINISHER cantilevered the conveyor into the barrel for continuous movement of parts through the abrasive. Parts shown fixtured on the conveyor are auto door handles, typical of irregular parts suitable for Gyrofinishing.

cession of large, versatile machines, all a variation on the original principle. The first of these were characterized by vertical barrels into which the parts were lowered by machine heads. The machine heads held a cluster of fixtures for simultaneous processing of parts. As better machines were built and tested, the abrasive mixtures were also refined. The original basic machine built by Process Development is still being used to test optimum abrasive mixtures for particular parts submitted for testing by various GM divisions who contemplate using Gyrofinishing.

Basic data obtained in the trials at the GM Technical Center determine the quality of finish, amount of surface area covered by this process, process time and the best abrasive material.

Is it as good as buffing?

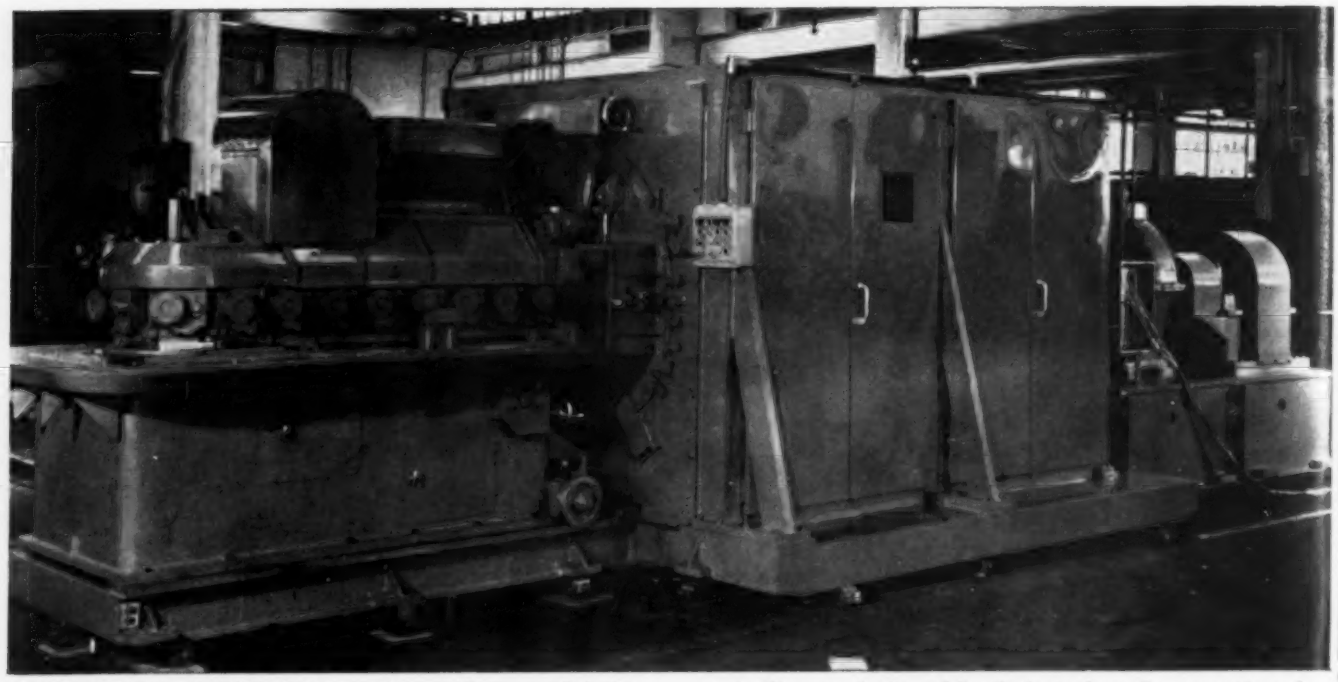
Zinc-alloy parts finished by Gyrofinishing show a surface just a "shade lower" in color than conventional buffed surfaces. Further, directional or flow lines may be more pronounced. But with the standard copper-nickel-chrome plating cycle, the fine abrasive lines or scratches don't show up at all, and color differences between buffed and Gyrofinished surfaces cannot be visually detected.

Gyrofinishing, GM has found, offers a lower unit cost than buffing, where the part is applicable with respect to size, shape and quantity.

Odd-shaped decorative parts have a tendency to tear or otherwise deteriorate buffs. These parts include hood ornaments, door handles, and the like. Here Gyrofinishing comes into its own.

Normally, .0005 to .001-inch of metal is removed from the surface of die cast parts by Gyrofinishing in a cycle of 60 to 70 seconds. Uniformity of metal removal is regulated by changing the position of the parts with respect to the flow of abrasive mixture to avoid the loss of design detail. Small holes and depressions cannot be generally finished by the method. The same limitation also applies to buffing, of course.

Often both sides of a part can be finished by Gyrofinishing in a single operation, which might be impractical with conventional buffing. The greatest cutting efficiency is obtained on the surface of the part nearest the periphery of the drum. The wedging action of abrasive material between the drum walls and the parts creates additional pressure and increases rate of cut. The heat generated by the cutting action gives off a vapor during the operation. Operating temperature may range up to 160°-180°F. Loss of water through this



CONVEYORIZED HORIZONTAL machine which preceded the model shown on the front cover can handle small decorative parts. Conveyorized models eliminate loss of process time during indexing of heads between drums.

GM Designs A Finishing Machine . . .

vaporization is compensated for by addition of water, since water content is important in obtaining maximum efficiency with water-mixed abrasive materials.

Abrasive mixtures vary

From the many abrasive mixtures evaluated in the GM Gyrofinishing studies, one type has been most widely adapted for production use. It consists of (1) Maizo (ground corn cob)—40 to 60 per cent by weight of the dry mixture; (2) Liquid buffing composition—60 to 40 per cent by weight of the dry mixture; and (3) Moisture—water 20 to 30 per cent by weight of the total mixture. Commercially available liquid tripoli compound is usually used to finish zinc alloy die castings and liquid stainless (aluminum oxide) is used for steel parts. Not all compounds are satisfactory for use in Gyrofinishing. They are selected on the basis of performance, cost, and cleaning in the plating cycle. The maizo or ground corn cob in the mixture is used as the backup or carrier for the abrasive particles. The grit is held to the maizo by the grease binders used in the liquid buffing compositions. Properly graded leather meal or sawdust may be substituted for the maizo carrier. Ready mixed loose abrasive materials are now commercially available which do not require water addition.

In actual operation, the Gyrofinishing abrasive mixture consists of millions of small ball-shaped particles 1/16 inch or smaller in diameter. The optimum relative speed with which the balls flow past the part has been determined as between 1500 and 1800 surface feet per minute.

Series of Machines Developed

The first Gyrofinishing machine for production finishing was a multiple station vertical machine designed and built for one of the GM car manufacturing divisions. It was used in polishing steel bumper guards and grill bars. The machine had a load-unload station, two polishing drums and a wash station to collect surplus abrasive. Four part-holding heads extended from a Maypole design superstructure. In operation, the spider superstructure raised, lowered and indexed the heads through the abrasive-carrying tubs by hydraulic actuation. Drums were rotated in opposite directions to achieve the best possible finish.

A series of single and multiple station vertical machines has followed this first production model.

Index time a disadvantage

In the vertical models, one limitation is the loss of process time occurring during the indexing of the parts from drum to drum. To overcome this a series of horizontal type machines have been built with continuous movement of parts through the process drum. Placing the axis of the drum horizontal also provides more uniform depth of abrasive mixture for processing. Parts to be finished are carried into the open end of the drum by a continuously operating conveyor. While they are in the drum, the parts are rotated or feathered by means of cams to present all the surfaces to the abrasive. Parts are loaded and unloaded outside the drum while the conveyor is moving. Some parts lend themselves to automatic unloading.

The abrasive mixture in the horizontal type machines is replenished during operation by means of a screw conveyor. The screw conveyor is used to pre-mix the abrasive material during loading, while spent abrasive is removed by deflecting it with a special blade into the same screw conveyor, operated in a reverse direction.

Commercial builders of polishing equipment are now offering machines that make use of this process. • • •

How Much Does it Cost To Run Your

Portable Air Grinders

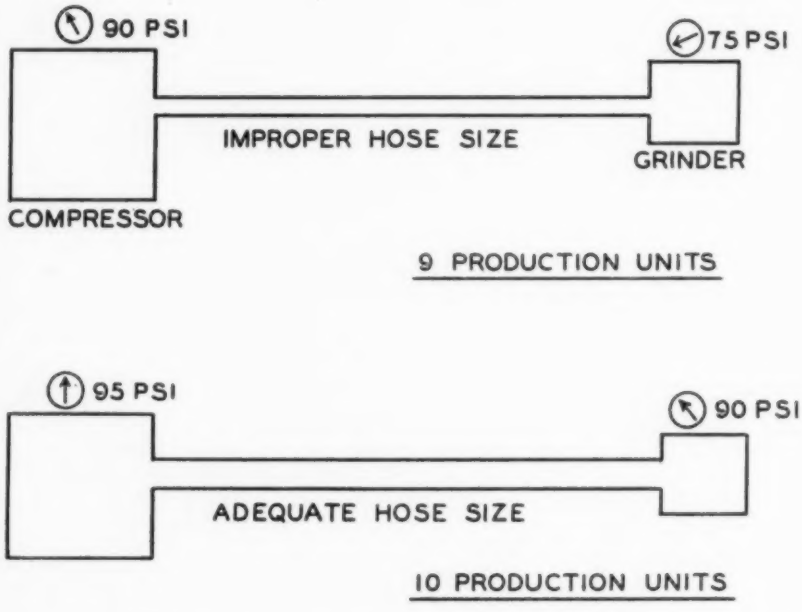
● The reliance of industry on compressed air to power portable tools has stemmed from two main factors: (1) recognition of compressed-air power as an economical and efficient medium and (2) its ability to perform tasks very difficult, if not impossible, to accomplish by other means.

Possibly of greatest importance under present conditions of high labor and overhead costs is the stable, almost static, cost of compressed-air power. An analysis of the operational cost for a portable pneumatic grinder will demonstrate that it is very low when compared to the cost of the operator's wages. As an example, the air to operate a heavy-duty 8-in. grinder costs less than 10 cents per hour, an insignificant figure when compared to the operator's hourly wage.

Another cost aspect is the effect of tool efficiency on the unit cost of production. The maximum output of a portable air grinder requires that an ample supply of compressed air at the correct pressure (90 psig) be available at the tool so that the grinder's full capacities may be realized. Production personnel must be aware that the pressure at the compressor, or at any other point in the system other than at the grinder itself while it is in operation, is not the criterion. It may be that compressor pressure is 90 lb but, if only a 60-lb pressure is available at the grinder, a loss in production of from 25 to 60 per cent can result. If such a condition exists, an immediate check must be made of pipes, valves, fittings, and air hose to determine whether proper size of pipe is used, size and length of hose is satisfactory, or obstructions exist.

Adequate Air Supply

The significance of an adequate



Actual pressure delivered at the tool is the criterion of how efficiently the portable air grinder can be expected to operate. It may be that compressor pressure is 90 lb., but if only a 60-lb. pressure is available at the tool, a production loss of 25 to 60 per cent can result.

supply of compressed air for a rotating-type pneumatic tool in attaining maximum tool efficiency is illustrated by the following example:

Assuming labor and overhead costs of $6 per hour, and with 5 men operating pneumatic grinders during an 8-hr day, the cost will be $240 ($6x5x8) per day. If correction of an inadequate air supply results in a 10% increase in production, the savings will be $24 (10% of $240).

If the 5 tools average an air consumption of 30 cfm with an inadequate supply, and assuming that correction of the deficiency results in a rate of 40 cfm and full power, an additional 50 cfm (10x5) would be used.

Presuming grinder used one-half of the time, the actual expenditure of air would be 25 cfm (50x50%), or 1500 cu ft per hr. At $0.06 per 1,000 cu ft, the additional air would cost $0.09 per hr, or $0.72 per day.

A comparison of the air cost ($0.72) with the production savings ($24) shows an obvious decrease in production costs.

An estimate of the time required for a grinder to pay for itself may be obtained from the following formula:

$$\text{Weeks to Repay} = \frac{\text{Cost of Grinder}}{\text{Savings per Week}}$$

Assuming that grinder cost is $150, labor and overhead costs $6 per hr, and that a savings of 10% is realized:

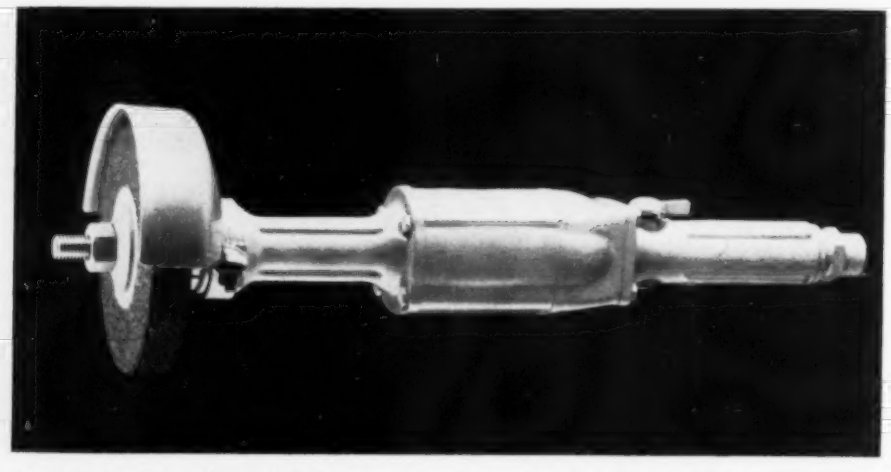
$$\frac{\$150}{\$6x40x10\%} = \frac{\$150}{24} = \text{About 6 weeks}$$

In order to realize the full benefits of compressed-air grinders three steps must be taken (1) the correct tool must be selected, (2) the right accessories must be obtained, and (3) the grinder must operate at the correct speed.

Tool Selection

A wide variety of grinders are available. Included among them are die grinders, buffers and straight grinders, vertical grinders, cone grinders, wire brushes, and sanders. A prospective user should consult the tool manufacturer in order to take full advantage of the latter's wide range of tool power and speeds and knowledge of special types of tools to meet unusual operating conditions.

An elastic bonded wheel with the lightest tool that will maintain full speed under load is usually the most effective combination for removing metal quickly. On the other hand, straight grinders will perform the majority of tasks—with vertical, cone, or extension grinders most effective for special applications.



6-INCH WHEEL GRINDER with guard can be operated safely at 6000 rpm.

To realize the full benefits of compressed-air grinders, three steps must be taken:

- The correct tool must be selected,
- The right accessories must be used,
- The grinder must operate at the correct speed.

Of great importance in the selection of portable tools is the stable cost of compressed-air power.

Accessory Selection

The accessories are no less important than the tool. Again, tool manufacturers are normally the best source of accessory information. Special applications, however, may require experimentation to determine the best accessory.

The most common accessories include cone wheels, mounted points (to reach comparatively inaccessible places), cup wheels (for corners), straight grinding wheels, sanding pads (of felt, rubber, or hemp impregnated with grit), buffing wheels (for fine finishes), wire brushes, and rotary files (small finishing operations).

Tool Speed

High rotating speed under load is mandatory for rapid grinding. Portable compressed-air grinders satisfy this requirement because of their high power-to-weight ratio.

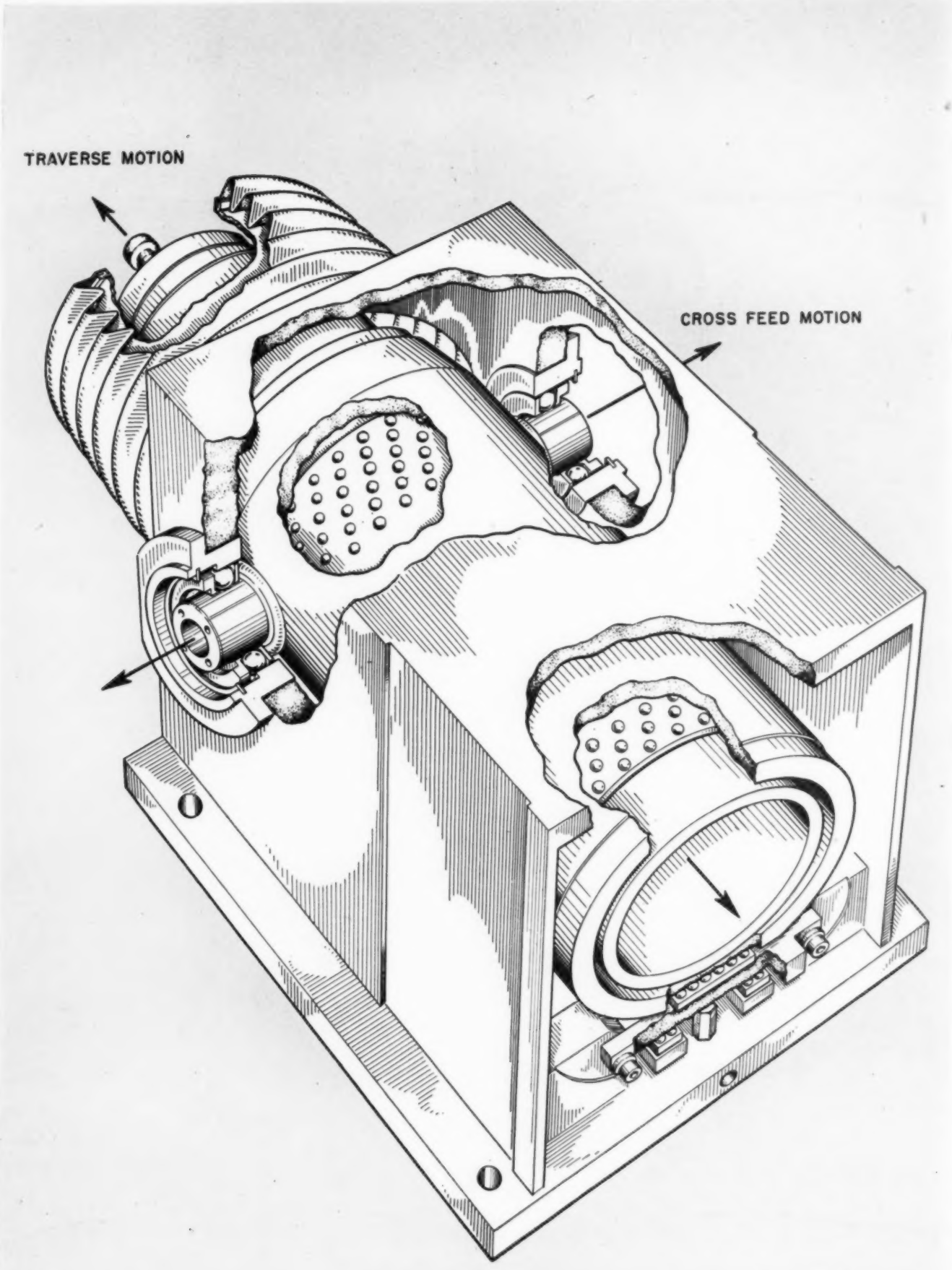
Automatic governors, set at maximum allowable speeds, usually limit the peripheral speed of pneumatic grinders. In general, wheels must not revolve faster than the speeds indicated below:

Vitrified Wheels: From 3,100 rpm for 8-inch to 21,000 rpm for 1¼-inch straight wheels.

Elastic or Organic Bonded Wheels: From 4,500 for 8-inch to 24,000 rpm for 1½-inch straight wheels.

Cup Wheels: From 3,500 rpm (vitrified) to 5,000 rpm (elastic) for 6-inch wheels.

Pneumatic grinders, essentially rotary vane-type air motors adapted to a particular abrasive tool for a specific purpose (usually finishing or preparing surfaces for finishing), have proved to be economical and very effective in most metal-working applications. It is only necessary to insure that the fundamental rules of tool and accessory selection and operational speed are not violated. • • •


TRAVERSE MOTION
CROSS FEED MOTION

First published details of

Bryant's Centalign Wheelslide

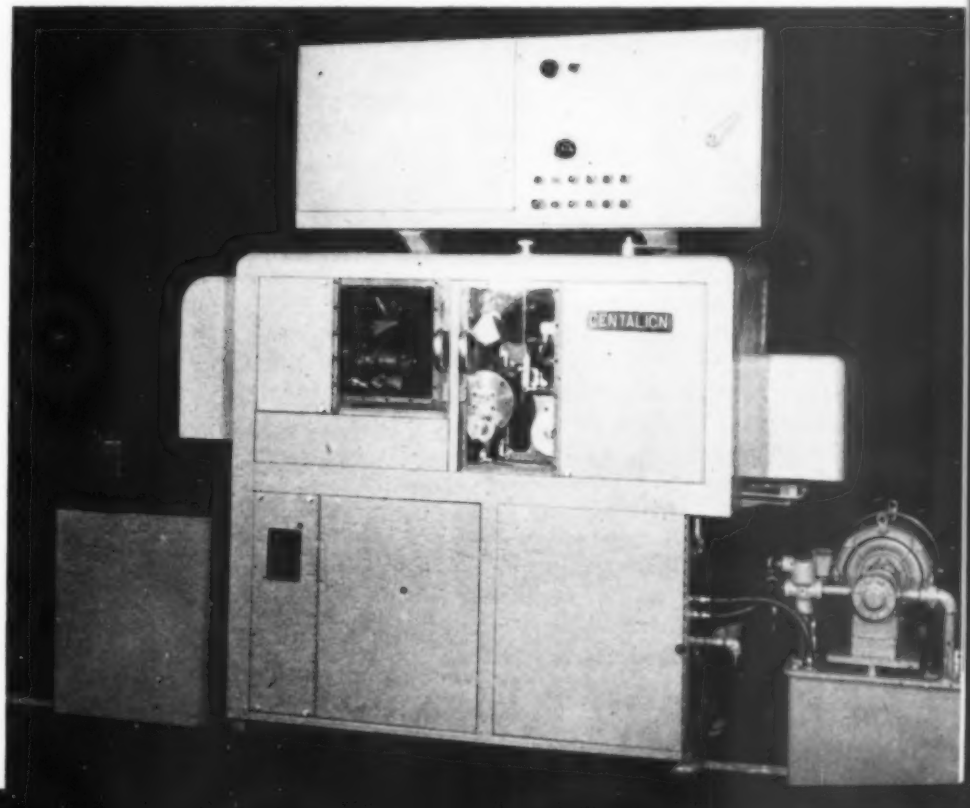
In designing the wheelslide of the Centalign internal grinder, Bryant tackled the problems of vibration, deflection and misalignment at their source. Result is probably the most compact wheelslide design in the industry, with operating forces applied directly in the same plane as grinding forces.

● An important key to operation of the Centalign internal grinder, introduced last year by Bryant, is the compact unit-type construction of the wheelslide, which incorporates in a single unit the longitudinal traverse and cross feed motions of the machine. Here are the first published design details of the Centalign wheelslide.

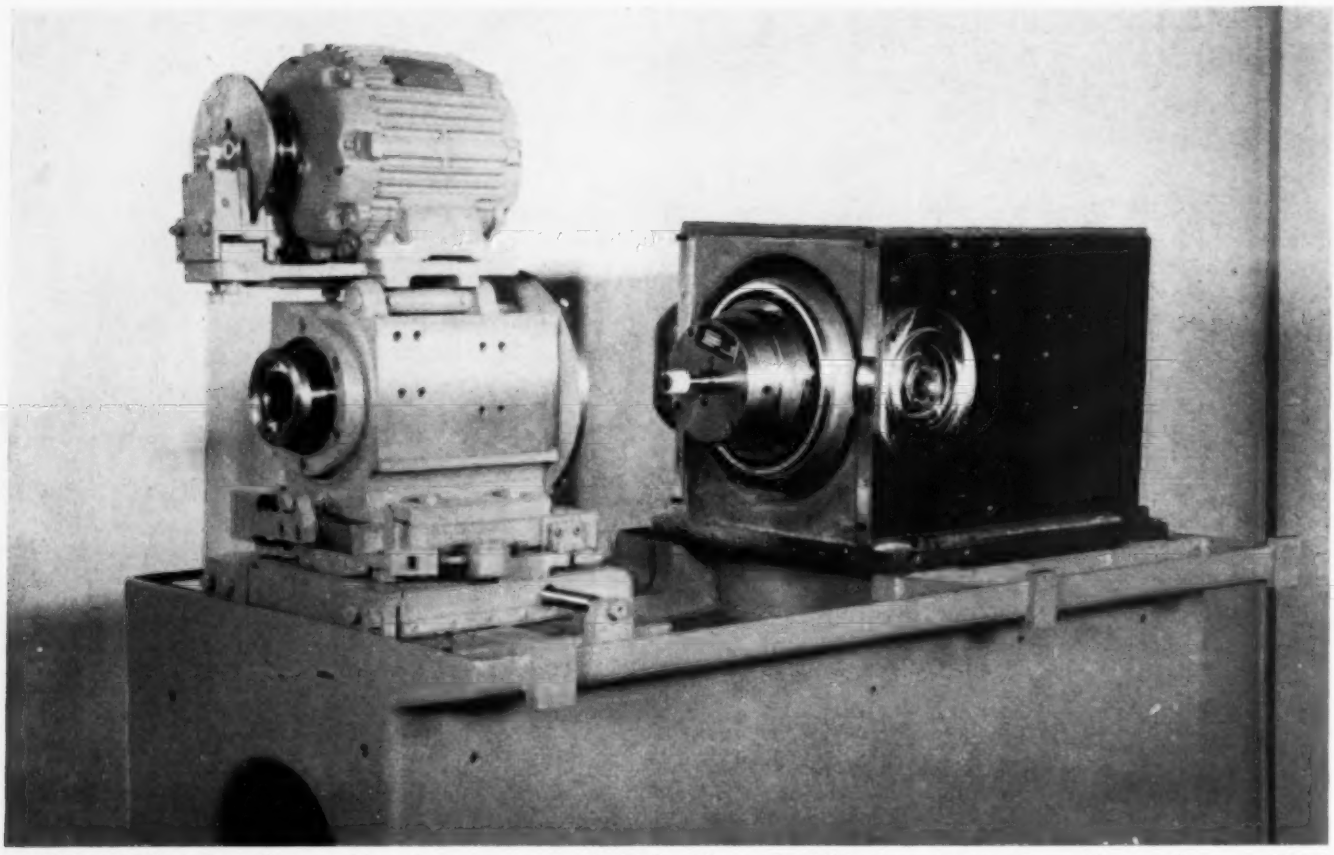
In approaching the design of the new Centalign grinder, Bryant engineers were faced with industry-wide demand for increased production of parts, without sacrificing accuracy or finish. Increasing production calls for faster stock removal, which must be accomplished by using higher operating forces in the machine.

With the conventional way-type internal grinder design, increasing the operating forces presents serious problems. The working tool is cantilevered at a considerable distance from the points of (1) support and (2) application of operating force. As greater force is applied at the line of contact between grinding wheel and workpiece, these forces must travel down through cantilevers and slides until they meet equal and opposing forces in the machine bed. Deflections and misalignment result and vibrations are magnified. These weaknesses of way-type machines become more significant when we realize that the deflections are proportional to the third power of the length of the cantilever. The amplitudes of any vibrations in the cantilevers are also proportional to the third power of the length of the cantilever.

These were the problems facing engineers at Bryant as the "Centalign" machine was planned. In the compact wheelslide design that resulted, all operating forces (traverse or stroking and cross feed) are applied in the same plane as the force between wheel and work. In the case of the stroking or traverse motion, the force is applied by a hydraulic piston located directly on the centerline of the wheel. Cross feed force is applied to trunnions very close to the wheelhead, minimizing the cantilevering of the grinding wheel. Loose



CUTAWAY, OPPOSITE, shows how high-frequency spindle is contained in heavily pre-loaded ball slides to accomplish stroking and cross feed motions. Right, complete Centalign machine.



STRIPPED DOWN Centalign machine shows compact wheelslide. Since wheelslide incorporates all machine motions, workhead is fixed.

Bryant's Centalign Wheelslide . . .

joints and oil films, unavoidable in any way-type construction, have been eliminated by the use of heavily preloaded ball slides surrounding the axes of both longitudinal and cross slide motion. The traverse or stroking motion of the wheelslide is provided by a rugged sleeve moving inside a cylindrical housing on heavily preloaded balls.

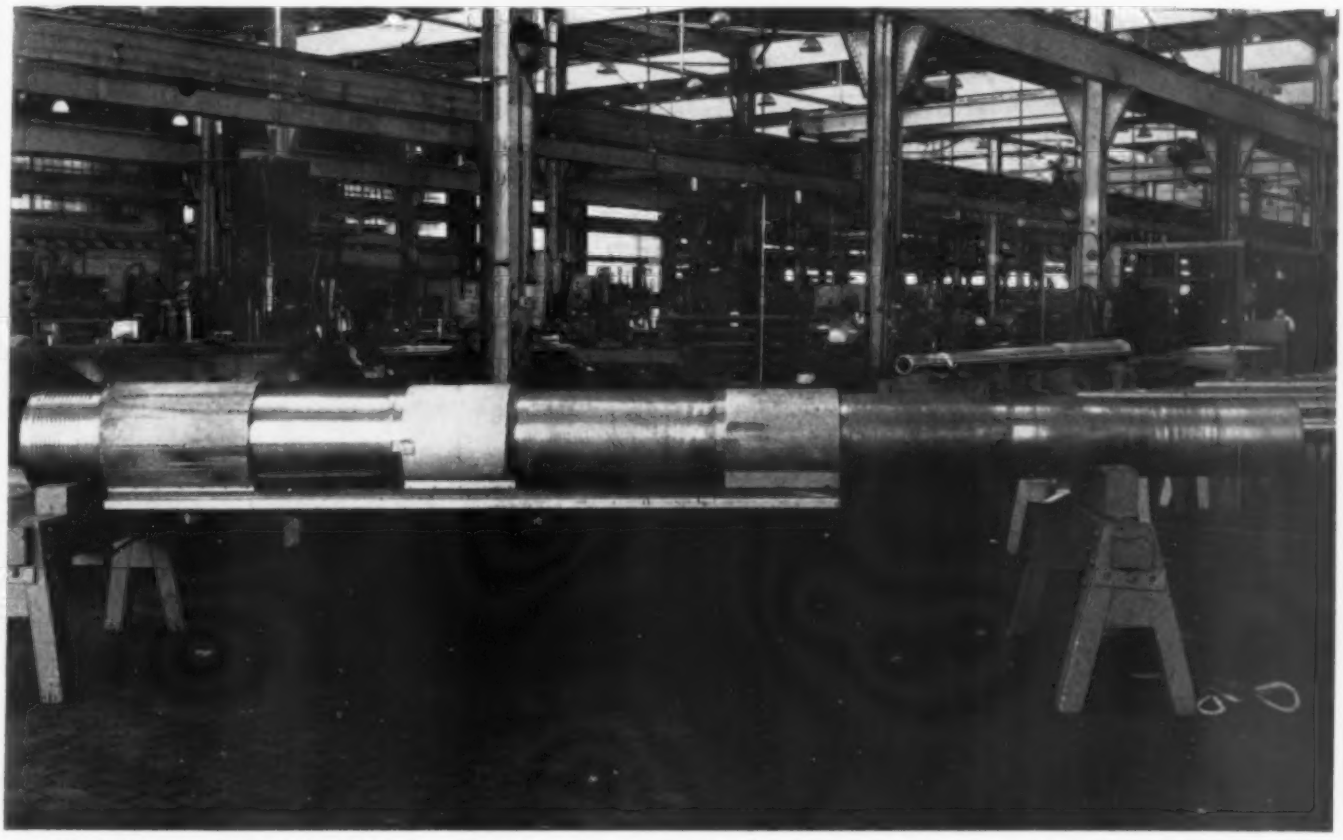
The cylinder which provides the cross feed motion of the wheelslide has two trunnions at the wheelhead end and moves in balls pre-loaded between these trunnions and the rigid box construction housing. The rear of the cylinder is supported for alignment purposes by an adjustable, preloaded plane ball slide. The wheelslide unit is completely sealed, preventing the entrance of foreign matter which assures lifelong accuracy of the unit.

The wheelslide is actuated by a simplified servo-controlled hydraulic system which in turn is programmed by a simple interchangeable cam unit. The servo controlled hydraulic system is a closed loop circuit comparable to the power steering used in modern cars, giving precise control of the wheelslide at all times with a minimum of input force. It contains only one servo-valve and therefore presents no maintenance problem as compared with the usual complex hydraulic systems.

The Centalign wheelslide is controlled by a camshaft and cams which provide pre-set programming of the machine cycle. When radical job changeover is required, the entire unit of cams and camshaft can be readily removed and stored for future use. Minor changes in workpiece requirements can be made by simply repositioning the cams. This feature results in considerable savings in setup time.

Surface finish problems due to vibrations from idlers, belts and drive motors have been completely eliminated by equipping the Centalign with Bryant high frequency wheelheads. These are installed within the inner sleeve of the wheelslide assembly, and are cooled from the machine coolant supply system. They are mist lubricated. Automatic couplings connect coolant, mist lubrication and electric power when wheelheads are placed in the machine.

Since all operating motions of the machine—cross feed and traverse—are accomplished by the compact unit-type wheelslide in the Centalign design, the workhead can be mounted directly to the machine bed. Its only function becomes the holding and rotation of the workpiece. This simplification of design in itself eliminates several sources of deflection and vibration which are unavoidable in the conventional way-type design. The workhead can be positioned both laterally and longitudinally for setup purposes and can also be swiveled on machines used for taper bore grinding. A wide variety of shoe type centerless and chucking fixtures, designed to furnish optimum grinding conditions, are available. Automatic loading and unloading of work parts makes possible installation of the Centalign in automated transfer lines. A simple, fully automatic feedback arrangement can be provided. • • •



8-INCH HOWITZER TUBE AND HOOP assembly. Manufacturing problem on the units was machining the ID of the hoops, shrunk onto the tube. Previous to the adoption of honing, they were flybored, and size control was unsatisfactory.

How Watervliet Arsenal

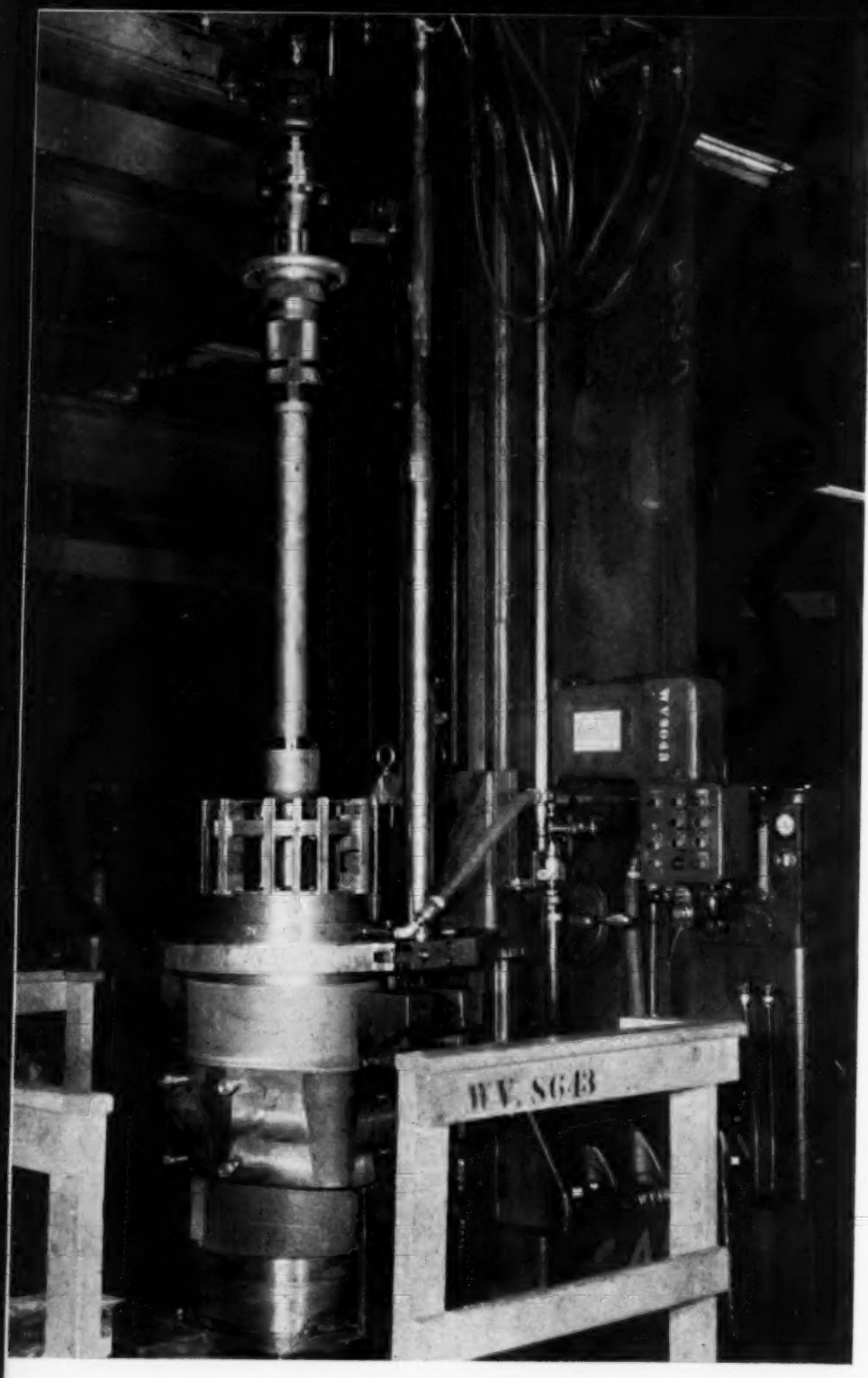
Hones Howitzer Hoops

What Watervliet Arsenal needed: A more precise method of machining the ID of 8-inch howitzer hoops, with reduced operation time. **Solution:** Operation is now performed by honing. **Results:**

- Machining time reduced by 25 minutes per hoop.
- Procedure is simplified.
- Closer control and better finishes are obtained.

● During World War II the Manufacturing Methods Unit of Watervliet Arsenal undertook a project with the goal of producing more precise bores in the hoops which are shrunk onto the 8″ Howitzer. After investigating several methods, honing was selected as the standard final processing step in the manufacture of the hoops, three of which are used in making one complete howitzer tube assembly.

Hoops for the 8″ Howitzer are designated as A, B, and C, and are of different sizes. Their internal surface must be machined to close



limits in preparation for shrinking. Attaining this precision was the problem.

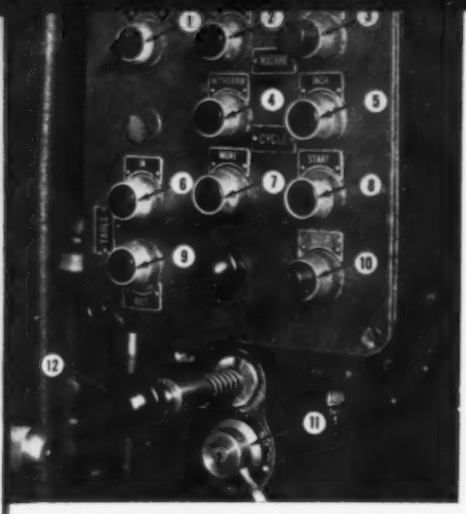
Prior to the use of honing, the internal surfaces of the hoops were finished by flyboring on a converted engine lathe (see next page). The lack of rigidity in the tooling being used plus the trial and error method of setting the tool contributed largely to consumption of considerable time and poor control of size. The lack of dependable size control from the flyboring operation made it necessary to machine the OD of the howitzer barrel to fit the hoops instead of machining the tubes and hoops to a specified dimension. This procedure, of course, was far from satisfactory. Production schedules were just barely being met.

For the flyboring operation, tool setting templates and more rigid boring bars were designed and put into operation. This was a step in the right direction and resulted in the reduction of operation time. Considered at the same time, however, was the possible use of honing, which ultimately was adopted as the standard finishing method.

Finally used for the hoop finishing machine was a Barnesdril vertical honing machine. Extensive tests were run to determine the proper application of coolant, the best abrasive material, and the production cycle that could be attained.

Immediately after the installation of the honing machine, the production cycle was reduced to 53 minutes, as opposed to the 60 minutes previously needed for the

ABOVE, INSERTING the honing body into the workpiece. Automatic hone expansion is one of the features of the honing operation. Right, former method involved flyboring the hoops on a lathe. Operation was inexact, and howitzer tube had to be finished to match the hoop ID after the hoop was bored.



CONTROL PANEL of the vertical honing machine. Switches include selector for manual or automatic, start and stop switches, vertical traverse, inch traverse, feed setting, and rapid expansion handle.

flyboring operation. As standard procedures were developed for the operation, this time was cut down to a total floor-to-floor time of 35 minutes, including actual honing time of 5 minutes.

The actual gains made in the operation can be summed up as follows:

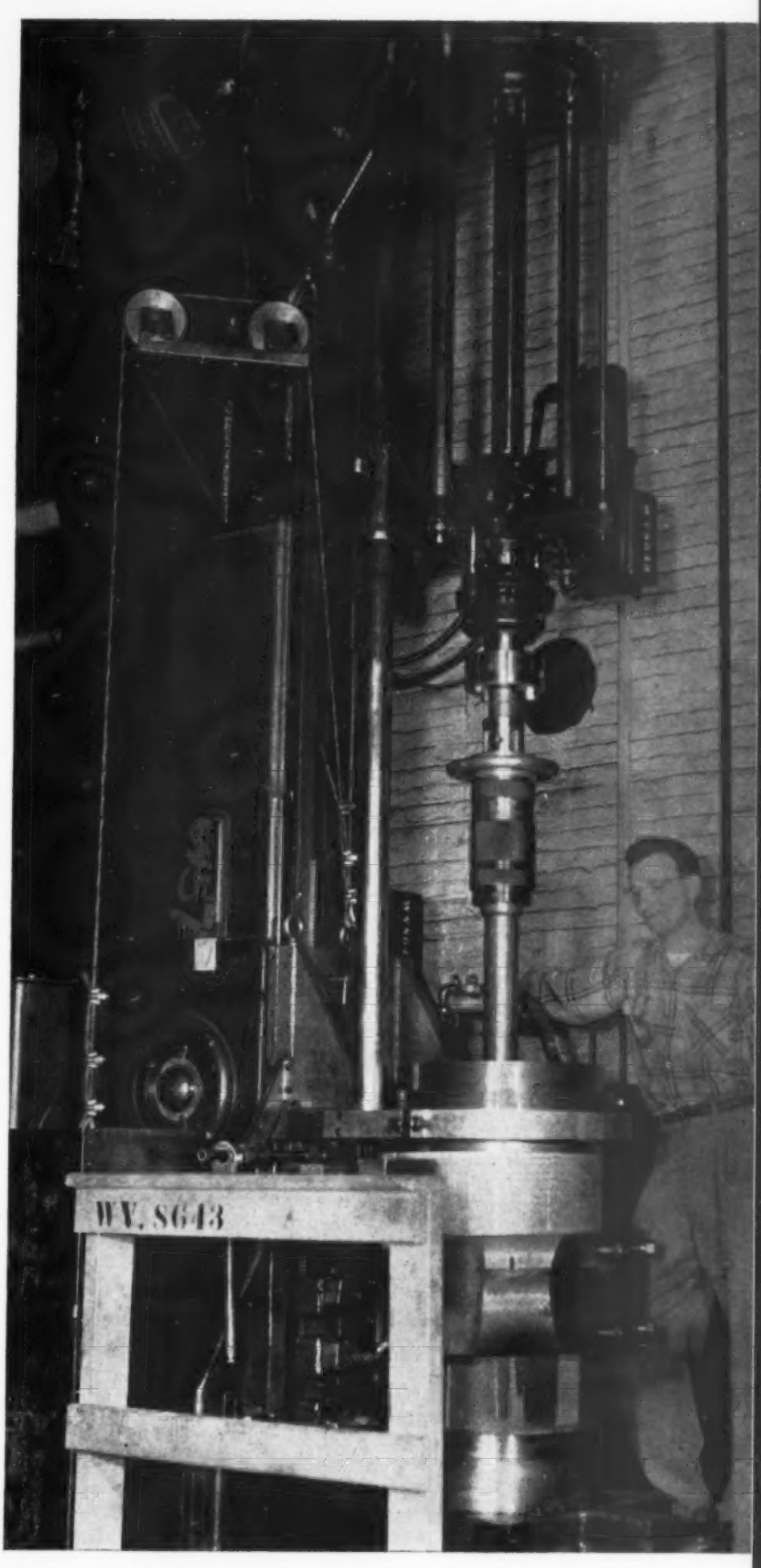
- Machining time has been reduced by 25 minutes over the previously used flyboring method.
- The procedure has been simplified.
- Closer control over size can be maintained.
- Better finishes can be obtained.

Tooling required for each of the three sizes of hoops includes a honing tool body and its associated stone holding parts. The honing stones used carry the specification 57A 1201-J8-VBE No. 22, dimensions ⅜ x ⅜ x 5. Stone life was established after considerable testing as being in a 1 to 1 ratio with the stock removed.

Coolant which was adopted as standard for the honing operation is composed of 7 parts kerosene, and 3 parts honing base (85% lard, 15% sulphur).

Workpieces of all three sizes of hoops are loaded into a universal fixture for the honing operation.

• • •



HONING AN 8-INCH howitzer hoop. The honing method finally adopted for the operation reduced machining time, gave simpler procedure, improved part quality.

Stainless isn't difficult to work, but is different. Continuing the treatment of basic rules for applying wheels and belts for surface finishing, which began in the May issue.

Part 2 – A guide to

Stainless Steel Finishing

By **W. E. McFee,** Supervisor,
Product Information Service
Armco Steel Corporation

Grinding and Polishing

Machinery; Many types of stationary and portable machinery can be used, depending on the kind and size of the work. Usually small pieces are ground and polished with large wheels on polishing lathes. Automatic straight line or rotary polishing machines also are used. Straight-line machines are best suited for flat parts or long narrow parts such as moldings. Rotary machines handle round contoured parts well, but not necessarily true circles. To prevent vibration, stationary machines should be heavy, rigid and solidly mounted. Large sections are ground and polished with smaller wheels on portable electric or pneumatic grinders. These should provide for an air stream blowing away from the operator's face onto the work to reduce frictional heat.

Wheel Dimensions-Speeds; Polishing lathes usually take 12", 14" or 16" wheels, portable grinders 5" or 6" wheels. The work governs the wheel face width. Recommended speeds are 6,000 to 8,000 s.f.m. for grinding and polishing stainless steels. Low speed wheels operate best at a minimum of about 5,000 s.f.m. High speed is about 9,500 s.f.m. Excessive speeds may overheat and warp stainless steels. Too slow speeds waste abrasive.

Grit Size; Condition of the initial stainless surface determines starting grit size. Deep surface defects must first be removed with a grit size for heavy cutting. Usually on a hot rolled, annealed and pickled

Finish*	Operation Sequence	Abrasive	Lubricant	Wheel		
				Type	Size**	Speed***
Welds		Aluminum Oxide Grit No. 40-60	Dry	Rubber, Resinoid or Fibre Bonded	4-8	4000-6000
No. 1	1	Aluminum Oxide Grit No. 60-80	Tallow or Grease Stick	Shop-Headed or Factory-Coated (Wheels or Belts)	12-14 S 5-6 P	6000-8000
No. 2D or No. 2B	2	Aluminum Oxide Grit No. 80-100	Tallow or Grease Stick	Shop-Headed or Factory-Coated (Wheels or Belts)	12-14 S 5-6 P	6000-8000
No. 4	3	Aluminum Oxide Grit No. 150	Tallow or Grease Stick	Shop-Headed or Factory-Coated (Wheels or Belts)	12-14 S 6 P	6000-8000
No. 6	3B	Pumice, Lime or Silica Flour	Oil and/or Kerosene	Tampico Brush	8-16	2500-5000
	4	Aluminum Oxide Grit No. 180	Tallow or Grease Stick	Shop-Headed or Factory-Headed (Wheels or Belts)	12-14 S 6 P	6000-8000
No. 7	5	Aluminum Oxide Grit No. 240-280 Abrasive Stick		Buff	12-14 S 6 P	9000-10000
	5B	Stainless Buffing Compounds		Buff	12-14	7000-9000
	6	Aluminum Oxide Grit No. 320-4000 Abrasive Stick		Buff	12-14 S 6 P	9000-10000
No. 8	6B	Stainless Buffing Compounds		Buff	12-14 S 6-8 P	7000-9000
	7	Stainless Buffing Compounds		Buff	12-14 S 6-8 P	7000-9000
Scratch-free, Mirror	8	Stainless Buffing Rouge		Buff	12-14 S 6-8 P	7000-9000

*Sequence of finishes which can be produced when starting with No. 1 pickled finish or No. 2D or No. 2B cold reduced finish.
Operations 3B, 5B, and 6B are special steps to finish off at the respective No. 6, No. 7, and No. 8 finishes. When working through to a higher finish, B operations are not used.
**Wheel diameter in inches.
***Speed in surface feet per minute
S—Wheel diameter for stationary machinery.
P—Wheel diameter for portable machinery.

TABLE 2—SUGGESTED SEQUENCE OF OPERATIONS FOR GRINDING, POLISHING AND BUFFING STAINLESS STEELS.

finish, rough grinding starts with No. 60 grit. However, on rough or uneven work, such as weld beads, a grit as coarse as No. 36 may be necessary.

Follow a definite sequence of grit numbers for various grinding and polishing operations, using progressively finer grits. For example, after grinding with No. 60 grit, the next operation may employ No. 100 grit, then No. 120 or even No. 150 grit, and so on. Or, the sequence could be 50, 80 and 120. The customary rule is not to increase grit for succeeding operations by more than 40 grit numbers. Experience will determine which is best for a given job.

Lubricants; Lubricants lengthen cutting life of wheel or belt and help control the type of finish desired on stainless steel products. Grease serves as a cushion, loads the surface and permits only tops of grains to contact the work. Depth of cut is reduced, which means that a No. 180 grit abrasive with grease will produce a finer finish than a No. 220 abrasive without lubricant. By selective use of lubricants the number of different grits used through a complete sequence of grinding and polishing operations often can be reduced.

Some of the commonly used lubricants for stainless steels are kerosene, a mixture of kerosene and machine oil, heavy machine oil, palm oil or equivalent, and heavy compounds of mutton tallow and stearic acid in stick form. Saponifiable lubricants are desirable for ease of removal.

First application of lubricant to a new wheel should be thorough and uniform, done with the wheel at rest. Then the lubricant can be safely applied to the moving wheel. Grease in stick form is also applied against a rotating wheel. Oils are spread on flat work and transferred to wheel or belt from contact with the work.

Operating Technique; Technique of the operator is of major

importance. Either he is trying to duplicate a standardized finish for a certain job or match an existing finish. These are factors that influence finish:

1. Wheel resilience. A particular grit on a soft wheel will make a different scratch than a similar grit on a hard wheel.

2. Wheel speed. The speed at which the abrasive is driven influences cutting action of the abrasive grain.

3. Lubricant. Nature and quantity of lubricant regulates depth of cut by each abrasive grain and thereby influences the finish.

4. Abrasive condition. Fresh and worn abrasive wheels and belts give different results. As an example, a used No. 120 abrasive may produce a finish comparable to a new No. 150 grit.

5. The machine. Portable tools give different results than stationary machines, and even results from stationary machines will vary widely.

The combined influences of these factors make it difficult to duplicate a finish exactly. However, the suggestions given in Table II may well serve as operational starting points.

Do's and Dont's

1. Don't try to shorten finishing time by bearing down on the wheel. This will only overheat and tint the metal. Keep work as cool as possible.

2. Break in a fresh wheel or belt on scrap material like that on which the abrasive will be used.

3. Broken-in abrasives are necessary when making grit comparisons to match a finish. An abrasive tool cannot be judged by its initial high cutting rate.

4. When changing grit size, clean the metal surface thoroughly to prevent mixing of grits and subsequent reworking.

5. Don't try to remove too much metal with fine abrasives. Use coarsest size possible consistent with the wanted finish.

6. Keep in mind that a fine grit will remove more stock from an already roughed surface than from a smooth surface.

7. Direct abrasive scratches straight and parallel. Proper technique will prevent herringbone scratches, gouges and chatter.

8. Don't overpolish in spots. Lift wheel above work before reversing stroke. Work stroke can be with or against direction of wheel rotation, as the operator prefers.

9. Protect polished surfaces outside of area being worked by covering or masking with adhesive paper.

Buffing Stainless Steels

By buffing, stainless steel surfaces can be brought to highly lustrous finishes not attainable by polishing work. But first, the surface to be buffed must be free of defects and deep scratches. Buffing generally follows polishing with a 240 grit or higher to provide an adequate starting surface.

Muslin buff sections built up to the required width may be the same as those used for abrasive-headed grinding and polishing wheels, or of a looser nature. Fine abrasive or polishing media are prepared commercially in a solid binder such as grease. It is applied intermittently by holding the stick or cake against the rotating wheel face.

Buffs; The many first rate commercial buffs include concentric sewed radial, radial arc, parallel and square sewed, and loose buffs with layers of fabric sewed only around the arbor hole.

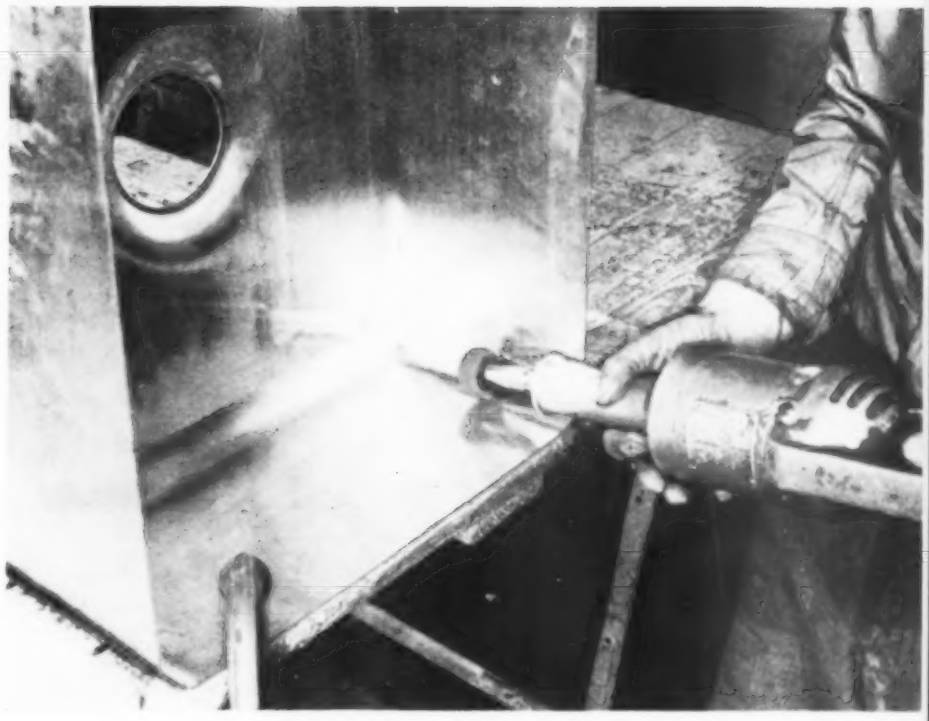
Standard buff sections are made up of about 20 plies of cloth. A cloth count of 86/93 is recommended for buffing stainless steels. Buff width is determined by the number of sections that make up the buff. Sections are separated with cardboard spacers at the hub to control resiliency. Because buff-

Desired Finish	Starting Finish	Operation Sequence	Abrasive	Type	Wheel Size	Speed—S.F.P.M.
	No. 1	1	Aluminum Oxide Grit No. 60-80*	Shop-Headed or Factory-Coated (Wheels or Belts)	12-14 S 5-6 P	6000-8000
No. 6 or Satin		2	Aluminum Oxide Grit No. 100-120*	Shop-Headed or Factory-Coated (Wheels or Belts)	12-14 S 5-6 P	6000-8000
		3	Satin Finishing Compound (Lea Compound** Grade "B")	Sewed Buff	6"	6000-8000
		4	Learok Grade 304-B	Loose Buff	6"	6000-8000
	Welding Heat Tints	1	Nu-Steel Paste or Liquid	Tampico Brush	8"	2400-3000
Removal of Heat Tints		2	Nu-Steel Powder	Hand Clean with Flannel Cloth		
Wire Brush	No. 2D or No. 2B	1		Stainless Steel Brush		4000-6000

*Use grease stick lubricant.

**Top dress with small amount of Learok Grade 304-B on the Lea Compound coating for lubrication.

TABLE 3—SPECIAL POLISHING PROCEDURES FOR STAINLESS STEELS



CORNER WELD BEAD being ground down with a small vitreous wheel on a portable electric tool.

ing speeds are high and stainless steels are by nature tough, buffs of the bias or special "ventilated" type are used to prevent scorching by the generated friction heat. Buffing wheels composed of alternate plies of muslin and sisal resist scorching and have proved their worth on stainless steels.

For most effective cutting, the buff face must collect the composition and hold it well. Type of cloth used influences the ability of the buff to hold the compound. Sewing or puckering controls stiffness. The harder the buff the faster the cut.

Compounds; "Cut-down" buffing removes a small quantity of metal and requires fast-cutting aluminum oxide in stick or cake form, applied directly to the moving wheel. "Color" buffing removes even less metal and brings out the color and deep mirror finish on stainless steel with a white compound of the levigated alumina type. Sulfur- or iron-containing compounds should not be used on stainless steels.

Stainless steel buffing compounds are produced for different applications and conditions. One of these cuts and colors in one operation. Whenever in doubt about the correct setting-up practice, consult manufacturers of compound.

Buff Sizes-Speeds; Buffing wheels used on polishing lathes are generally 12" to 14" in diameter with 3" face. Portable tools use 6" to 8" diameter buffs with a 1½" face. Wheel face may be any width required for the work. Maximum speed for cutting stainless steels is 10,000 s.f.m. For color buffing it is 9,000 s.f.m. Speeds beyond 10,000 s.f.m. are risky in hand buffing complicated shapes and buff wear tends to be excessive.

Where cutting and coloring are done on the same constant speed machine with different compounds, use a slightly larger diameter buff for cutting than for coloring. It is well to remember also that portable tools usually operate under the recommended surface speed.

Special Buffing Strip; Armco Steel Corporation and other mills produce a "buffing quality" No. 2 Finish stainless steel strip. This grade has a special surface for immediate buffing plus the correct temper required for fabrication. It can be brought to a comparable chrome plate finish with only a buff, simply by cutting with 320 grit, then color buffing with stainless steel rouge.

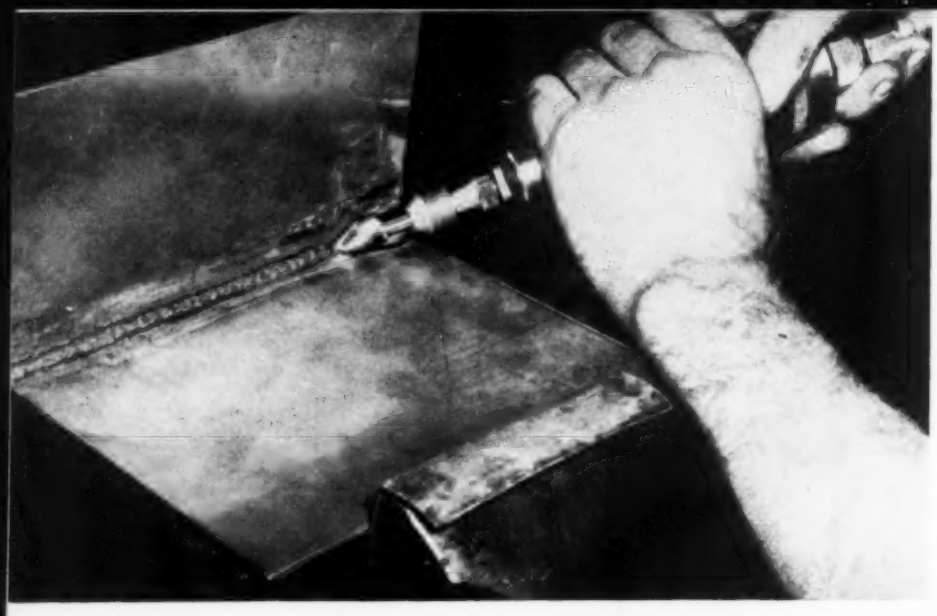
Satin Finishes; The satin finish is not a buff, but rather a fine polish. It is achieved rapidly by using special satin finishing compounds on a buffing wheel. These compounds can be obtained in approximately 120 to 400 grit and free from harmful iron for work on stainless steels.

Loose buffs with fabric sewed once around the arbor hole are preferred. Compound is a mixture of abrasive and glue binder. Applied directly to the wheel, it dries quickly owing to a drying element.

Satin finishing compounds may be used instead of one or more polishing operations before buffing. How to use them is shown in Table III.

Tampico Brush Finishes; Standard tampico brush finish is known as No. 6 Polish, also as "satin" finish. It has a smooth, dull matte surface with no polishing scratches and lessened reflectivity. It is produced at the mill by brushing a No. 4 Polish or higher finish with a rotating tampico fiber brush loaded with fine abrasive and lubricant.

Quality of finishes depends on the original surface. Some work is buffed before tampico brushing to enhance the surface effect. Even so, an attractive and relatively low-cost finish can be produced on No. 2 Finish stainless steel strip and No. 2 B Finish sheets by tampico brushing alone. Simply use 150 to



CARBIDE BURRS ARE USEFUL for cutting down stainless steel weld beads. High speeds are necessary. The tree-shaped burr is well-suited for cutting inside corner weld beads.

180 grit abrasive and a suitable lubricant.

Both stationary and portable tools may be used, at speeds up to 5,000 s.f.m. Brushes come in ½" wide sections in 6" to 16" diameter, usually with a pressed steel hub. Sections are built up on a spindle or adapter to 2½" face width or wider.

When a swing grinder is used on relatively large flat surface, apply a paste of abrasive and lubricant to the work. One of these is Italian pumice and kerosene. With portable tools an abrasive stick is commonly applied to the brush. The brush should be kept above the work in order that excess compound will be thrown on to the work.

For the most desirable finish, apply brush lines in the rolling direction of the metal. A long stroke will eliminate lap marks and spots more highly finished than the rest of the work.

Weld Bead Finishing

First, snag off excess welding rod metal with a coarse rubber-resinoid- or fibre-bonded wheel on a portable grinder. Wheels are 4" to 8" diameter. Recommended speed is 4,000 to 6,000 s.f.m. Fibre-bonded disks on a disk sander also cut fast. Swing grinders and hand block sanders with endless abrasive belts are effective on open surfaces. Carbide burrs do good work in hard-to-get-at-places.

Use No. 60 grit after rough grinding; then a series of grits as suggested under "Grit Size." Work up to as fine a grit as needed to match the rest of the metal surface. As an example, No. 4 Finish is mill-produced with 150 grit and lubricant.

When grinding, move the wheel in a continuous motion *parallel* to the bead. Smooth the bead but do not remove it completely. Leave some stock for removal by polishing. Be careful not to make a groove along the weld when the finish is finally blended with the rest of the metal surface. Polishing strokes should be made *only* in the same direction as the original polishing lines.

To blend welded areas with a buffed mirror finish, use the same compounds, practices and buffing operations as for buffing the original unwelded metal.

Finish Matching; Reasons have been given why it is impossible under common shop practice to duplicate exactly a finish or to blend a weld bead with a mill finish. To produce a surface where welds cannot be detected, the finish of the entire assembly must be raised. One way is to first bring welded areas as close to the original metal finish as possible. Then go over the polished weld and all mill-polished surfaces with a well-oiled No. 220 to 400 abrasive cloth on a hand block. Or, an abrasive flap on a power tool may be used with lard oil as a lubricant.

Carbide Burrs; Carbide burrs are most effective in cutting down stainless steel weld beads. They are comparatively inexpensive, can be resharpened at little cost, and more than pay for themselves on many jobs. High speeds are necessary on either flexible shaft machines or air-driven tools. These spindle speeds recommended by a well-known burr manufacturer may be reduced for fine cut burrs:

¼" diameter, 16 teeth—41,000 r.p.m.
⅜" diameter, 20 teeth—33,000 r.p.m.
½" diameter, 24 teeth—26,000 r.p.m.
⅝" diameter, 27 teeth—20,000 r.p.m.
¾" diameter, 30 teeth—15,000 r.p.m.
⅞" diameter, 33 teeth—11,500 r.p.m.
1" diameter, 36 teeth— 9,500 r.p.m.

Two commonly used burrs are the cylindrical shape with flat end and the tree shape with pointed end. The pointed burr is excellent for cleaning up weld metal from inside corner welds.

Carbide burrs are somewhat brittle and should be handled more carefully than high speed steel burrs. Abuse may cause teeth to chip out. These burrs do their own cutting and, when properly applied, remove a large volume of metal. Do not overheat carbide burrs and see that operators wear the right kind of safety glasses.

• • •

CORTLAND SEGMENTS

IN V2P BOND

COMBINED WITH GA ABRASIVE

The Cortland Shape

provides a grinding action that promotes unequalled high rate of stock removal and improved grinding finishes. Cortland Chucks are available in these diameters: 6", 8", 10", 12", 14", 16", 20", 22", 24", 26", 30", 32", 36" and 42" — and are made to fit standard types of vertical spindle surface grinding machines.

give you the answer to the problem of *economical* surface grinding with *better finish* — tested and proved time and time again. Prove it to yourself on your own vertical spindle grinding machines.

Call in a Cortland Engineer for a convincing demonstration.

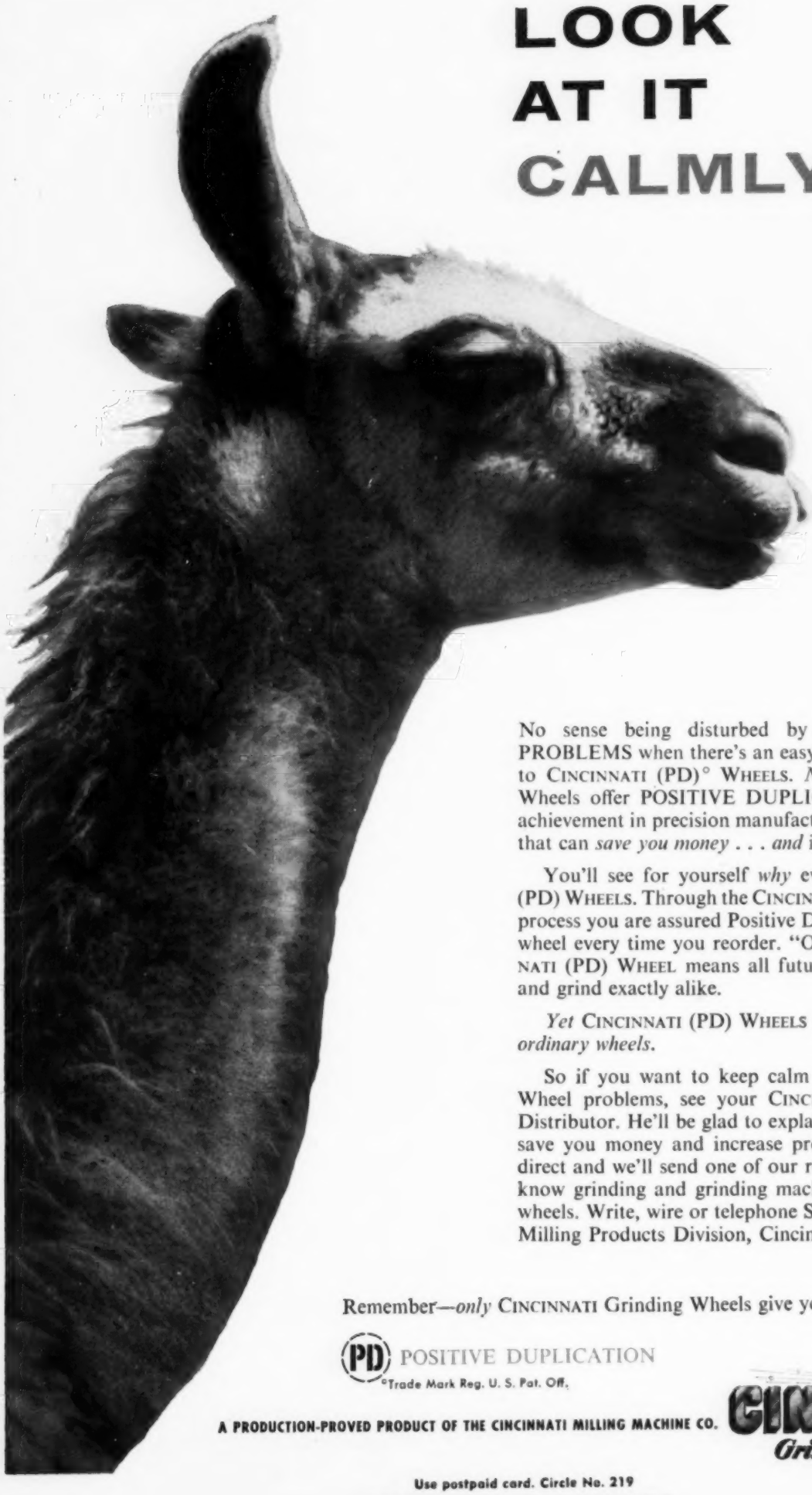
CORTLAND GRINDING WHEELS CORPORATION

Chester, Massachusetts

CORTLAND

Use postpaid card. Circle No. 218

LOOK AT IT CALMLY



No sense being disturbed by GRINDING WHEEL PROBLEMS when there's an easy solution in sight. Switch to CINCINNATI (PD)° WHEELS. *Now* Cincinnati Grinding Wheels offer POSITIVE DUPLICATION—a remarkable achievement in precision manufacturing and quality control that can *save you money . . . and* increase your production.

You'll see for yourself *why* everybody's talking about (PD) WHEELS. Through the CINCINNATI (PD) Manufacturing process you are assured Positive Duplication of the original wheel every time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.*

So if you want to keep calm in the face of Grinding Wheel problems, see your CINCINNATI Grinding Wheels Distributor. He'll be glad to explain how (PD) WHEELS can save you money and increase production. Or, contact us direct and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

Remember—*only* CINCINNATI Grinding Wheels give you

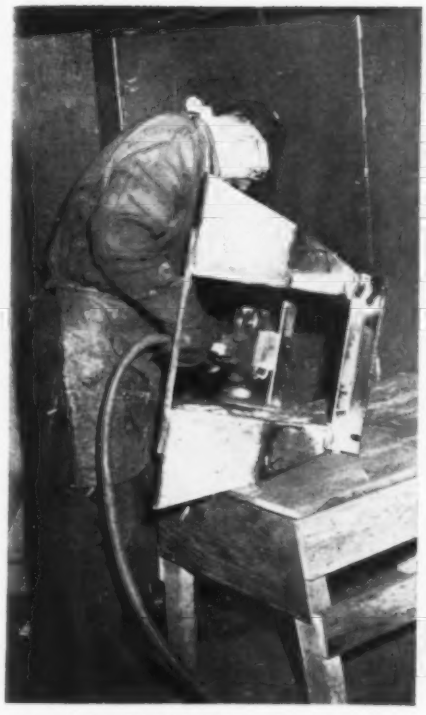
(PD) POSITIVE DUPLICATION

°Trade Mark Reg. U. S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

CINCINNATI° *Grinding Wheels*

Use postpaid card. Circle No. 219



PORTABLE GRINDERS find wide use in working the rough spots off weldment in this shop. Here the work is being correctly performed, with piece set firmly on bench of suitable height and grinding wheel properly handled. Worker should, however, have goggles rather than merely safety glasses.

WORKMAN HERE is subject to a number of hazards, largely of his own making in hasty work. Lack of goggles presents a hazard, particularly with welder working immediately above him, burning off large rough spots on the railroad car weldment. Tangle of air lines also presents a hazard.

CORRECT OPERATION. Workman has both goggles and dust respirator, safety shoes, and is using peripheral grinding wheel correctly. Grinding with these wheels should never be performed on the side of the wheel.

GRINDING safely

by **Edmund Mottershead,** President
Mottershead Associates, Chicago

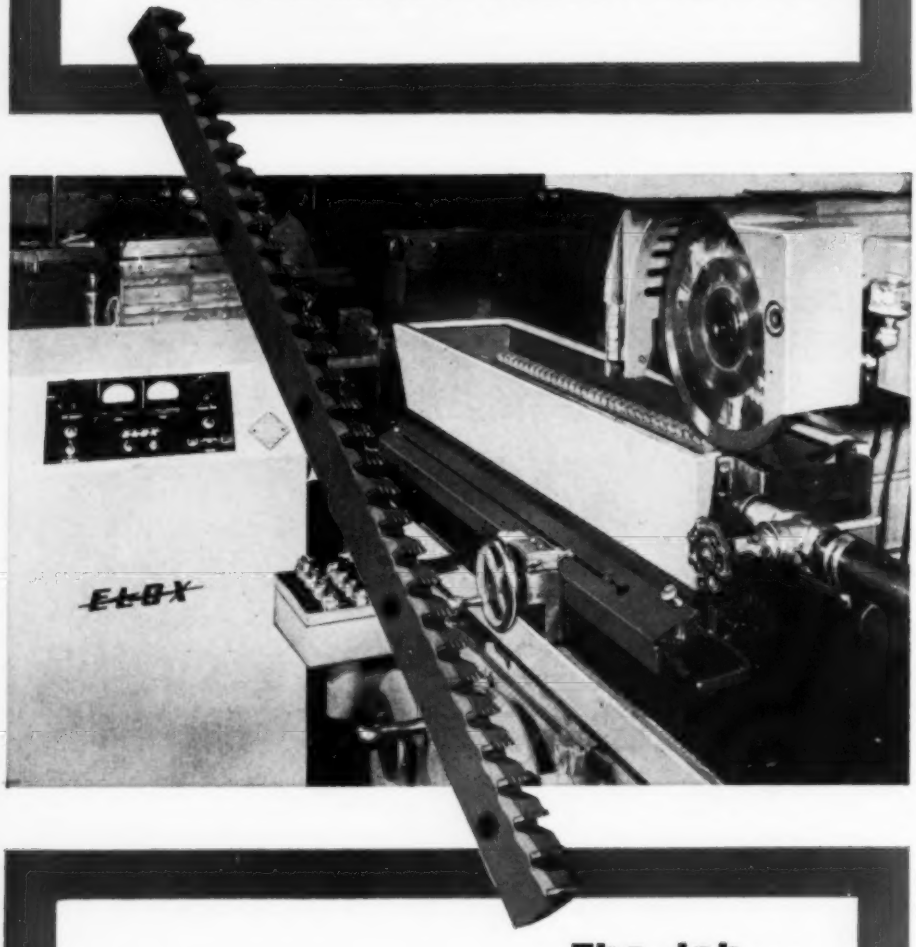
● Small, portable grinding wheels are subject to much abuse under normal working conditions in many shops. The speed of production, particularly where men are required to climb around on very large pieces of work, makes for carelessness on the part of the operators. Air lines readily become tripping hazards. Wheels may be dropped or laid down carelessly and become cracked. Improper grinding on the wrong surface of the wheel in order to get into corners or out of the way places on the work also leads to wheel strain and abuse.

Dropping the wheel carelessly to the floor, bumping it into the work, or putting too much pressure on it can all cause cracking and breaking. Vitrified wheels are particularly subject to damage from this type of abuse. Normal safety procedures plus common sense as to the real nature of the grinding wheel will help operators not only get the most production out of their wheels, but also work safely at all times.

The facts are that, regardless of how carefully the manufacturers of grinding machines design their equipment, and in spite of the care with which wheel manufacturers build wheels for specific tasks, the ultimate results in terms of safety and productivity depend largely upon the operator. Using the wrong wheel for the job can lower production and create unsafe condition. Using the machine incorrectly can harm the wheel and create dangers . . .It's up to the operator to protect himself and his equipment in his own self interest.

One of the major hazards which occurs through improper operation involves the use of the wheel without the guards usually provided. If all wheel breakage could be eliminated there would, of course, be no real need for guards. At the same time, it is apparent that portable wheels cannot be as thoroughly guarded as wheels mounted on stands or heavy machines. Operators who remove the guards, or who run portable wheels without guards, are needlessly endangering themselves without speeding their work. • • •

"elox saves us $294
...8 operations
form grinding this broach"
Ford Motor Aircraft Division



Savings on preformed carbide blanks	$ 32.00
Omitted operations savings	120.00
Diamond wheel savings	142.00
Sums up to	$294.00

The Job...
Broach, used for broaching the pine tree form on turbine blades of the J-57 Jet engine.

NO DIAMOND WHEEL...

EDM substitutes inexpensive brass wheels costing less than $45 for expensive diamond wheels costing a minimum of $150. Brass wheels are formed for $1 as against a diamond wheel contour forming cost of $35.

NO PREFORMED CARBIDE BLANKS...

Conventional machining necessitates preformed tungsten carbide and preformed steel shanks. EDM machines the carbide, brazing material and steel simultaneously, and requires no indexing to assure a perfectly formed broach as to location and size.

OPERATIONS...

Conventionally machined, the pine tree broach requires 22 operations. EDM does it better in 14.

Electrical Discharge Machining has reduced the machining time of this intricate form in 32 carbide tipped teeth to a total time cycle of 33 minutes . . . one-half the time of abrasive grinding. Tolerances held to: +0, —.0002".

elox corporation of michigan *T.M. Reg.

1820 N. STEPHENSON HWY. • ROYAL OAK 3, MICHIGAN

EDM keeps you ahead of competition • Grinding • Die Sinking • Form Grinding • Single Point and Insert Tool Sharpening

Use postpaid card. Circle No. 220

Takes 12-Foot Measurements Accurate to .00001-Inch

Pratt & Whitney Company Inc. has shipped a 12-foot measuring machine to the Aircraft Gas Turbine Division of General Electric, Evendale, Ohio.

The machine, with a measuring capacity of 144 inches as compared with Pratt & Whitney's longest standard model of 80 inches, is the largest of its kind that Pratt & Whitney has made for a manufacturer of jet aircraft engines. It will be used for the inspection of product parts.

The 144-inch machine reads directly to .00001 inch with controlled measuring pressure.

Essentially, the machine consists of a master bar, measuring head and Electrolimit tailstock, all mounted on a seasoned rigid bed.

The master bed is made in three sections and has 144 stainless steel measuring bar buttons. Each button carries a finely-drawn hair line exactly 1 inch from button to button. The hair line is visible through an attached 75 power microscope and is used for setting precisely each inch of length according to the length required on the part to be inspected.

The headstock is direct reading and will repeat to .00001 accuracy. The measuring screw has a precise 1 inch travel. The graduated dials include a vernier graduated .00001".

Electrolimit pressure control through the tailstock is very important in obtaining precise readings. The tailstock is graduated to provide pressure controls from one pound to two and one-half pounds.

One of the important features in maintaining and guaranteeing precise readings is that a portion of the bed is deep and amply ribbed for stability. The bed was scraped at 68° Fahrenheit, 50% humidity in a constant temperature laboratory. For more than five weeks, expert craftsmen, long familiar with hand scraping, carefully removed all high spots from the ways to produce a bed which is straight and parallel.

The measuring machine is ready for taking a measurement when the measuring head is properly positioned from zero to the hair line on the desired master bar, and after the pressure tailstock is adjusted to the required measuring pressure. • •

H○LES

JIG GROUND with

Vulcanaire

Provide yourself with this inexpensive* instrument for use on your present equipment and JIG GRIND with a guarantee.

A five station indexing fixture from Vulcan's Contract Tool Room (Your tool room in Dayton).

Using a jig borer index table with the Vulcanaire 5 indexing holes and 35 locating and clamping holes were JIG GROUND in place. Result — eliminated all close locating and dowelling of individual parts and of course hours of time.

*Vulcanaire equipment pays for itself on the first job.

{ Borrow our instructive 11 minute movie on Jig Grinding. }

Services of your Tool Room in Dayton

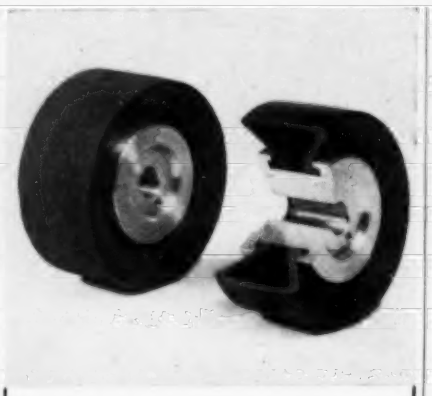
Engineering . . Processing . . Building . . Special Machines . . Vulcanaire Jig Grinders . . Motorized Rotary Tables . . Brehm Shimmy and related dies.

Vulcan's 41st Year

VULCAN TOOL COMPANY
743 Lorain Ave., Dayton 10, Ohio

VULCAN tools

Use postpaid card. Circle No. 221



Nu-Matic announces new principle in inflated grinding wheels

The new "Aircore" design consists of only TWO parts . . . the drum and the core. And, it is SELF SEALING . . . as the hollow rubber drum is inflated it automatically makes positive, leak-proof contact with the metal core.

Check these PLUS features:

PRECISION OPERATION. Wheel always runs true because rubber drum seats on accurately machined core. Vibration-free operation.

FEWER PARTS TO STOCK AND MAINTAIN. No nuts, bolts or sideplates.

TROUBLE-FREE CORE. Made of machined aluminum. Can't break, crack or leak. Will last a lifetime.

Three models are available: 3" diameter x 2" width, 4" diameter x 2" width, 5" diameter x 3½" width.

WRITE FOR COMPLETE SPECIFICATIONS. Also, ask about Nu-Matic's new "Flexcore" . . . an expanding-type grinding wheel with replaceable rubber segments.

NU-MATIC GRINDERS, INC.

8224 Carnegie Ave. Cleveland 3, Ohio

Use postpaid card. Circle No. 222

BEFORE—scenes like this were frequent at 18 different spots in the sprawling plant of General Electric's Metallurgical Products Department, Detroit.

Carboloy's New Timekeeping System Eliminates Production Lags

● When a production worker walks into General Electric's Metallurgical Products Department plant in Detroit today, he leans over a call box at his work station and reports his presence, clock, job as well as operation number.

This information "flashes" into a central office and is immediately key-punched into a tabulating card. Later, when the worker finishes his first job, he again visits the call box and reports what he has accomplished, including details of the new job he is about to tackle. He repeats this procedure every time a work change occurs during the day. At the end of his shift, the central office automatically bal-

WORKING AS FAST as a police communications network, the central office—manned by seven girls around the clock—quickly collects information on keypunched tabulating cards, integrating it with a master tabulating card.

NOW—call box (above) flashes timekeeping, production information to central office. Automated communications save over 1000 feet of floor space, many man-hours.

ances out his work for the day against his actual clock hours.

This, in essence, is a new automated timekeeping system at work. Installed almost a year ago, to cover the several buildings of the company's plant, the system is well on its way to a pay-off.

According to L. R. Butler, manager of payroll and timekeeping, who developed the setup, the automatic system already has paid itself off three times over—making an annual saving of about $36,000. It immediately released eleven badly-needed workers for other duties, and picked up additional man-hours by eliminating "travel and waiting time" required under the old timekeeping method.

The system, he says, also brought about a saving of about 1000 square feet of floor space, and created an interesting and diversified job for the timekeepers in charge of the central office.

Most important, he pointed out, the system today provides a faster flow of accumulated information to the organization's accounting departments and management. For example, it can spot machine downtime, and detect unrealistic production piece counts. It also can be used to ascertain the "job status" of work-in-process, to cost work-in-process inventories, and to record daily all completed jobs.

The new system is a radical departure from the old procedure which required the services of 18 timekeepers, Butler explained. Under the old method, the timekeepers were "sprinkled" through-

Here's a simple, economical way to turn water into an *all-around* superior grinding solution for ferrous metals and titanium! For ferrous metals, just mix 1 part W&B Grinding Concentrate 1500 with 150 parts of water. You'll get a low-cost, transparent mix that really keeps wheels open . . . settles chips instantly. Provides excellent rust protection and freedom from foam too. Grinding is keener . . . machines stay cleaner. Get complete information on this outstanding grinding concentrate. Fill out and return attached coupon.

W&B Grinding Concentrate 1500 is being used by many of the country's largest manufacturers.

W&B INDUSTRIAL LUBRICANTS

THE WHITE & BAGLEY CO.

Worcester, Massachusetts • Detroit, Michigan

Originators of Grinding Lubricants

THE WHITE & BAGLEY CO., 88 Foster St., Worcester, Mass.

Please send me complete information on W&B Grinding Concentrate 1500 — and the list of large users.

Name ..... **Title** .....

Company ..... **Street** .....

City ..... **Zone** ..... **State** .....

☐ My plant has a tricky grinding problem on which we'd like advice. I've attached a letter describing it in detail. I understand that you offer this service without obligation.

Use postpaid card. Circle No. 223

out the plant in various departments. Their jobs called for recording date, clock number of the employee, job number, operation number, work produced, and figuring elapsed time on each production voucher. The vouchers, in turn, were "balanced out" daily with the employee's actual clock card hours.

The procedure also required the worker to check "in and out" with his timekeeper five or more times during his working day. In reporting a work change, the employee also lost a certain amount of productive time. The extent of this time depended on the distance, the route and necessary detours to reach the timekeeper.

Also, upon reaching his destination, the worker often would find the timekeeper already occupied, and he would be forced to wait patiently in line for service. The timekeeper, himself, because of the spasmodic nature of the reporting, due to varying production-completion schedules, frequently found himself with nothing to do.

The new two-way communications, or audio-timekeeping system changed all this. It is as fast as the radio network employed by most police departments, and as automatic in tabulating and accumulating information as a chain store cash register.

Each call station is a contact with the central office—and no more than 60 feet from any production worker. To date 28 call boxes are strategically located within the plant, according to number of employees, and volume of job changes concentrated in the work areas. In the central office, three master "send and receive" sets make it possible for any call originating in the plant to be simultaneously registered on the master control boards.

All the variable data is gathered on keypunched tabulating cards which are integrated with a master tabulating card. The latter contains prepunched rates and job information, and in effect presents a "whole package" to the machine accounting unit.

According to P. J. Jensen, Metallurgical Department manager of manufacturing, "this is one instance of how 'paper-work' or office automation reaches out as a management tool to help the production worker.

"In this instance," he says, "the system not only helped us find additional manpower within the company for productive work, but eventually, it will pin-point those production variables which crop up to hinder a production worker from turning out a creditable day's work."

He pointed out that the Detroit operation, in many ways, is not a true production-line activity. Actually, he said, it is more like a large-scale laboratory operation.

"As an example," he said, "we know from the 28 years we have been in the cemented carbide producing game what can be expected of our people. But we never seemed to have sufficient information quickly enough on those mechanical variables that come up to plague a worker attempting to turn out a good day's work.

"A malfunctioning pill press, or a temperamental sintering furnace, where the workers have to expend considerable effort is not fair to the employees. With the information provided by the new system, we can quickly pin-point these variables without penalizing the worker or questioning his abilities."

• • •

Performance Plus!

Harig's NEW 6x12 TML SURFACE GRINDER

The new TML by Harig provides extremely fast and accurate grinding, with a new operational ease never before known. 100% more longitudinal travel than before with each rotation of the wheel. You get smooth surfaces in minimum time. Economical—low maintenance.

SPECIFICATIONS

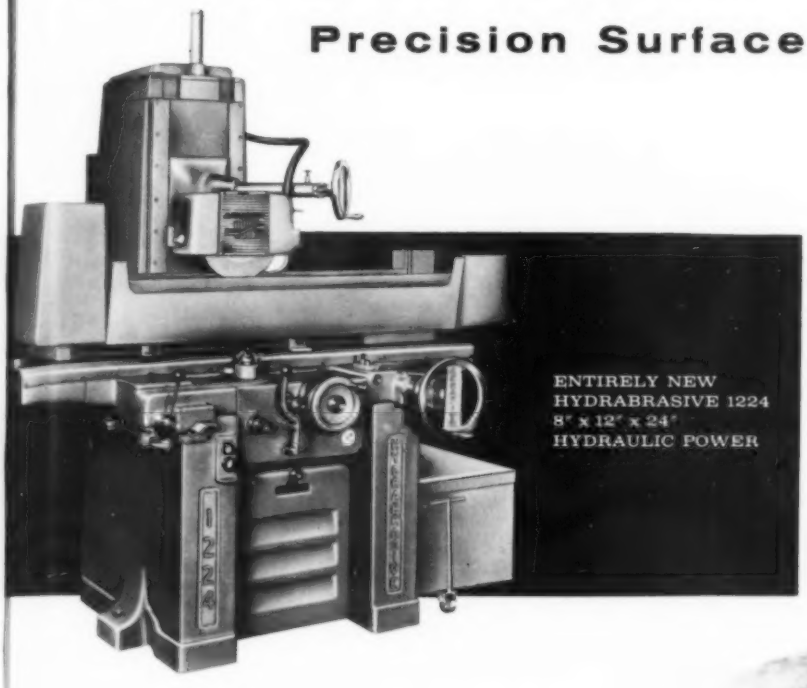
Longitudinal travel.....12⅜"
Transverse travel.....7"
Vertical travel.....12¾"
Working surface of platen.....6"x12" ½" T slot
Grinding wheel.....7" dia. x ½" face
Grinds 12¾" over platen with 7" wheel
Standard spindle speed 3000 R.P.M.
½ or ¾ H.P. motor—Net wt. with motor 575 lbs.
Can be used with or without floor stand.

Harig Manufacturing Corp

5769 W. HOWARD ST. • CHICAGO 31, ILL.
Phone NEwcastle 1-5050

Use postpaid card. Circle No. 224

Tools and parts for the finest products in the world are ground on *ABRASIVE* Precision Surface Grinders



ENTIRELY NEW
HYDRABRASIVE 1224
8" x 12" x 24"
HYDRAULIC POWER

Proven unexcelled in advanced design, flexibility of capacities, modern features, effortless operation, precision accuracy, maintenance ease. Wherever you are . . . there is an Abrasive dealer nearby. Operation, construction and price information for the entire Abrasive line is immediately available upon request.

ABRASIVE
MACHINE TOOL COMPANY
EAST PROVIDENCE 14, RHODE ISLAND

Bay State abrasive engineer Don Kennedy put in enough years in the Navy to learn about rust removal and other grinding jobs the hard way. Whatever your company's grinding problems may be, you'll find Bay State representatives like Don Kennedy ready to help and competent to work out practical solutions.

They're wearing his "hat" wheels* ...and they wear well

When Bay State's now-famous *"hat" wheels** were first introduced at a large East Coast shipyard, they caused quite a sensation. Here were revolutionary new grinding wheels that tore off metal like cup wheels but were much less heavy . . . that handled as easily as coated abrasive discs but cut faster, lasted longer and did more work at lower cost.

In addition to outstanding product performance, however, Bay State offers prompt, intelligent service. Sales engineer Don Kennedy not only works with top supervisors; he gets out on the job with the operators and digs into their problems, too.

As a result, his recommendations are both practical and specific . . . Blue Flash for speed and heavy stock removal . . . Bayflex to resist loading on soft metals . . . Saf-T-Cut for longer life on hard, jagged surfaces . . . DuraCut for blending and finishing broad areas.

** Raised hub disc wheels, reinforced for extra safety.*

BAY STATE
WHEELS of PROGRESS

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts
Branch Offices and Warehouses: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities. Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ontario.

Use postpaid card. Circle No. 308

GRINDS SHEET STEEL OR STRIP TO IMPROVED FINISH IN A SINGLE PASS!

Rugged New Pinch Roll Grinder by Mattison eliminates chatter and revolution marks!

Put a stop to customer rejects and speed production of titanium, zirconium, stainless, and carbon steel sheets, plates, or strip . . . grind to correct gauge thickness . . . and make your production more automatic by installing this new Mattison No. 456 Pinch Roll Grinder. It's a heavier, more rugged machine capable of producing No. 3 finish with a 100 grit belt *in a single pass*. Diamond design improves belt performance and reduces belt cost. There's no vibration or chatter —you get high-quality finishes even on light-gauge steel. High horsepower permits you to grind accurately to size. Positive stops control parallelism within close limits. Photocell control of the grinding aperture (optional) prevents the leading edge of the sheet from marking the belt, eliminating "pickup" on subsequent sheets.

MATTISON MACHINE WORKS ROCKFORD, ILL. U.S.A.

HIGH-POWERED PRECISION SURFACE GRINDERS

NO. 455 RECIPROCATING TABLE SHEET POLISHER

Has same smooth, rugged head unit as No. 456. "Floats" sheets against contact roll for fine polishing.

Used in many plants for putting on a final finish after preliminary grinding on the No. 456.

SEND for new illustrative bulletin, with complete facts and features.

Mattison Machine Works
545 Blackhawk Park Avenue, Rockford, Illinois

- ☐ Please send bulletin on No. 456 Pinch Roll Grinder.
- ☐ Please send bulletin on No. 455 Wide-Belt Sheet Grinding and Polishing Machine.
- ☐ Please send literature describing Tube Grinders.

Name _____ Title _____

Company _____

Address _____

City _____ Zone ____ State _____

Use postpaid card. Circle No. 225

Paul Meline, second from left, Managing Editor of Hitchcock's Machine and Tool Blue Book, makes a few notes as Barnes Drill Company President, Albert M. Johnson (center); Chairman of the Board, Walter M. Fairbairn (right); and Vice-President, Roger Marriott (far left), explain "Controls and Advanced Mechanization" of a new Barnes Drill numerically controlled machine.

THE MAN FROM HITCHCOCK

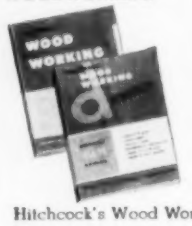
Nothing excites Paul Meline, Hitchcock's MACHINE AND TOOL BLUE BOOK Editor, more than an advanced example of automation in machine tools. To satisfy his curiosity, and insure an accurate reporting job, Paul recently traveled to Barnes Drill Company, Rockford, Illinois, to examine a newly developed numerically controlled machine. This electronic marvel handles short lot production, drilling, reaming, spotfacing, boring, tapping, and chamfering. Here is an example of the metalworking industry's tremendous forward look toward ever greater production, speed, efficiency and economy.

Indicative too, of a forward look in editorial policy, is the presence of the man from Hitchcock wherever trade news is in the making. This editorial coverage means better readership—the key that unlocks the door to advertising success in every Hitchcock publication.

METALWORKING

Machine & Tool Blue Book
Machine & Tool Directory
Grinding and Finishing
Carbide Engineering

WOODWORKING



Hitchcock's Wood Working Digest
Hitchcock's Wood Working Directory

TRANSPORTATION

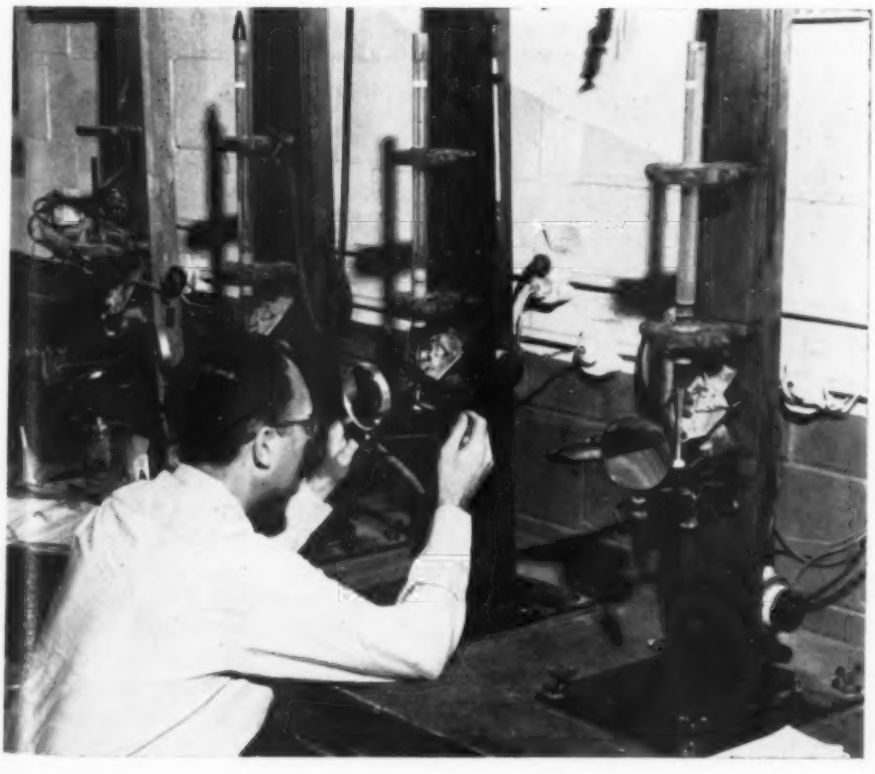
Mass Transportation
Mass Transportation's Directory
School Bus Trends

hitchcock
PUBLISHING COMPANY
WHEATON • ILLINOIS
SINCE 1898

THE PIONEER OF CONTROLLED CIRCULATION

Accurate grading of abrasive powders is especially important for critical finishing operations such as lens grinding. Which raises the question: How close is

Abrasive Grain Quality Control



SEDIMENTATION TEST measures size uniformity of optical powders, which are held to tight quality limits.

by **B. P. Haire,** manager
Fused Alumina Department
The Carborundum Company

● Over the past fifty years industry has called for finer and finer finishes, and higher and higher lusters. To cope with this demand, abrasive manufacturers have produced increasingly finer and more closely graded abrasive powders. It is interesting to note that in 1915 powders in the 40 to 60 micron range were in chief demand, while today, this demand is in the 20 micron and finer range. As this trend toward finer abrasives has developed, size and quality controls have become more difficult and exacting. The number of grains per unit weight increases at an

Clear The Air for Production...

with Kirk & Blum Downdraft Dust Control

Dust-laden air in your shop not only brings protests from workers . . . dust makes itself felt continuously in your profits.

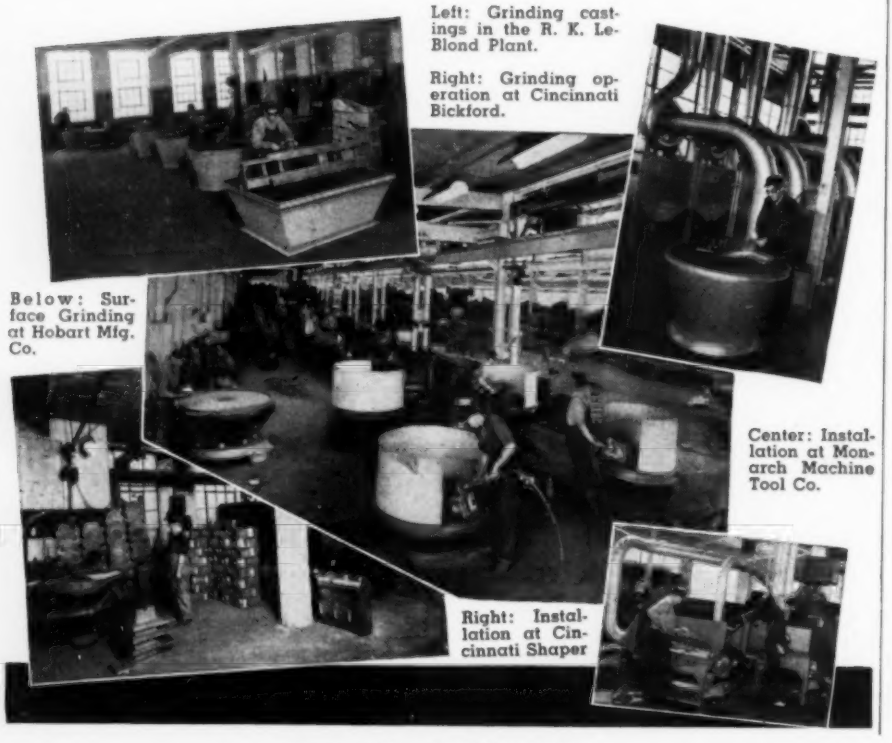
Pioneered by Kirk & Blum, *Down Draft* Dust Control Systems offer new cost reduction in castings cleaning. The dust produced in grinding, chipping and other operations is removed as soon as formed. Modern K & B Systems work so effectively that frequently cleaning operations are carried on in the same department with precision tools.

Whatever your problem in dust control, call on Kirk & Blum's 50 years of experience to solve it.

THE KIRK & BLUM MANUFACTURING CO.

3124 Forrer Street **Cincinnati 9, Ohio**

KIRK & BLUM



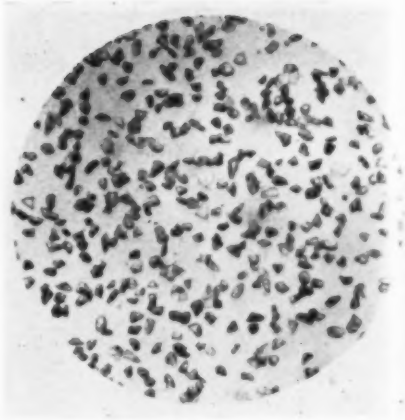
Left: Grinding castings in the R. K. LeBlond Plant.

Right: Grinding operation at Cincinnati Bickford.

Below: Surface Grinding at Hobart Mfg. Co.

Center: Installation at Monarch Machine Tool Co.

Right: Installation at Cincinnati Shaper



PHOTOMICROGRAPH of 225 Optical Finishing Powder taken at 100 magnification.

Quality Control . . .

amazing rate as one goes to successively finer powder grades. The following approximate figures show this increase:

Grit	*Number of Silicon Carbide Grains in One Gram of Powder*
240	3,500,000
280	4,800,000
320	9,500,000
400	40,000,000
500	250,000,000
600	440,000,000

It is obvious that the number of grains in sizes finer than 600 grit would be fantastic. The above tabulation points up the fact that variations from standard in these finer sizes will materially affect the surface area of a given grit number, and certainly surface area is a critical factor, whether the end use be wheels, buffing or lapping compounds, or coated products.

Powders for use in wheel manufacture are held to exacting chemical, color, shape, and size specifications. The sizing control of these powders is by sedimentation and microscopic control, the sedimentation test being based on Stokes Law —which gives the rate of fall of a small sphere in a viscous fluid.

Powders for coated abrasive product use are held to similar tight specifications with particular emphasis on shape and the surface condition of the crystals.

For the compound trade, abrasive powders are likewise subjected to chemical, color, shape, and microscopic size control. In addition, such powders are also tested for

(continued page 54)

Increase Pieces-Per-Belt *30% OR MORE* with MICHIGAN ABRASIVE BELTS

FACTS FROM TYPICAL MICHIGAN ON-THE-JOB FILE:

OPERATION: Backstand grinding-finishing die cast auto-trim parts.

FORMER BELT: Resin bond, 180 grit - 150 pieces per belt.

MICHIGAN BELT: RED COAT Resin bond, 180 grit - 250 pieces per belt.

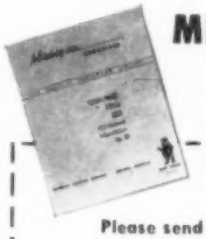
66⅔% more pieces and nothing was changed but the belt!

Yes, it may be hard to believe but, it's true! And, as you know, nothing puts more value into sales dollars than a major cut in manufacturing costs! More and more people who *thought* they were getting peak production per belt are being amazed at the *additional* production they get from Michigan Abrasive RED COAT Resin belts, discs and sheets.

If you *think* you are getting maximum production and life from your present coated abrasives, you owe it to yourself, for the sake of profits, to test Michigan RED COAT Brand products in your operation. Only then will you *know* if your grinding and finishing costs are at rock bottom.

Michigan Abrasive is the fastest growing manufacturer of coated abrasives in the country . . . and no wonder! The proof is in *performance*. See for yourself what RED COAT, the sharper cutting, cleaner cutting, smoother finishing brand of coated abrasives, can do for you. Call your Michigan representative today or mail coupon for free, complete catalog and representative will call you for appointment. Do it soon. You'll be glad you did!

Michigan ABRASIVES ®



MICHIGAN ABRASIVE CO.

Manufacturers of "*The Humidity-Controlled Abrasive*"

11911 E. 8-MILE ROAD • DETROIT 5, MICHIGAN

I want to know more about Michigan Abrasives.

Please send free Catalog ☐ Have representative call ☐

Name_____

Title _____

Firm_____

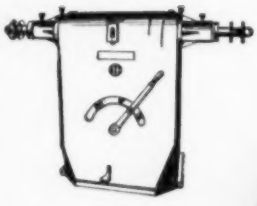
Address_____

City_____ Zone_____ State_____

RED COAT BRAND

Use postpaid card. Circle No. 227

BUFFERS—
Direct, Belt, gear, vari-speed



GRINDERS . . . BUFFERS

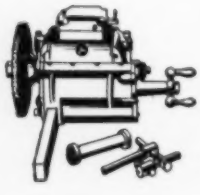
These superb electrical grinders and buffers . . . 1/3 to 40 hp . . . set the pace for highest quality and efficiency . . . and for amazing savings in cost and maintenance. Preferred by industry everywhere!

ATTRACTIVELY PRICED

United States Electrical Tools

Over 60 years of Service to Industry

GRINDERS—
Lathe, tool post, angle plate, vertical spindle



GRINDERS . . .

Direct, gear, belt drive, swing frame, vari-speed single or dual motor, portable, bench, angle plate, die, wet, disc and snagging grinders; combination grinder and buffer.

BUFFERS

Direct, belt, gear, vari-speed buffers.

United States Electrical Tools are electrically and mechanically correct.

ALL ROTATING PARTS AND SPINDLES ARE PRECISION-BALANCED DYNAMICALLY BY LATEST ELECTRONIC EQUIPMENT

WRITE FOR CATALOGS

The United States Electrical Tool Co.
3640 LLEWELLYN ST., CINCINNATI 23, OHIO

Use postpaid card. Circle No. 228

SIZE TOLERANCES for optical powders are checked by lens grinding inspection in the Carborundum Powder Laboratory.

Quality Control . . .

oil and stearic acid absorption factors, which are in effect measures of surface area.

Optical powders, used in lens grinding, are likewise held to very precise quality limits. For this custom-made product, tight size tolerances and size uniformity are paramount; supplemented by chemical, color, and shape specifications. The size uniformity is measured by sedimentation test, while the size tolerances are checked by lens grinding inspection. In this lens grinding test, no scratches deeper than the grit being tested are tolerated.

The following tables show the typical grit range and average size in microns of standard numerical powders and optical powders:

Standard Numerical Powders

Grit	*Coarse*	*Average*	*Fine*
240	85.0	50.0	25.0
280	70.0	39.0	19.0
320	60.0	31.0	14.0
400	45.0	22.0	11.0
500	40.0	19.0	10.0
600	35.0	16.0	9.0

Optical Powders

Grit	*Coarse*	*Average*	*Fine*
250	38.0	25.0	18.0
225	34.5	22.5	16.0
200	31.5	20.0	14.0
175	28.5	17.5	11.5
145	24.5	14.5	9.5
125	22.5	12.5	7.5
95	17.5	9.5	5.5
50	16.0	5.0	2.0

• • •

grinding and finishing

Free Literature

Use the postpaid card opposite page 65 to receive your copy of any of the literature listed on these pages. Just circle the proper number on the card and mail it. We'll do the rest.

Grinding Wheels

28-page general catalog lists and describes the selection of grinding wheels offered by Fuller Merriam. The company specializes in the fast-cycle manufacture of wheels and other bonded abrasive products. Bonds used in its products are the exclusive property of the company, developed by its own engineers. Rapid delivery schedules are met by the firm as a result of close coordination of all departments. A supplementary guide to grinding wheel selection is also available.

The Fuller Merriam Co., West Haven 16, Connecticut.

Use postpaid card. Circle No. 1

Dust Collector

The Vertical Rotor Dust and Fume Eliminator has been introduced to meet the need for a relatively low-priced, yet high efficiency wet method collector. Test results compare favorably with any of those published by similar method units. Contaminated air enters this collector at high velocities. A cyclonic action is set up in the outer chamber causing the larger particles to drop into the surface of the integral tank. The air stream next passes through a vertical water curtain to eliminate heavier particles, then through a high velocity horizontal water curtain to remove finer particles and remaining contaminants. A series of baffles removes excess moisture before purified air is either vented to the atmosphere, or where desired, returned to working area. The unit is easily maintained, can be constructed of corrosion resistant alloys or lined where necessary, and features low overall height to fit into trusses.

Schmieg Industries, Inc., 23930 Sherwood, Centerline, Mich.

Use postpaid card. Circle No. 2

Air Chucks

A new catalog has just been published by Cushman Chuck Company, completely describing the line of air operated chucks, cylinders and accessory equipment. The new catalog is divided into seven sections, each of which is step-cut to provide a quick reference to chuck or cylinder descriptions, dimensions, part lists, accessories, general information and other Cushman products.

The Cushman Chuck Co., 806 Windsor St., Hartford 2, Conn.

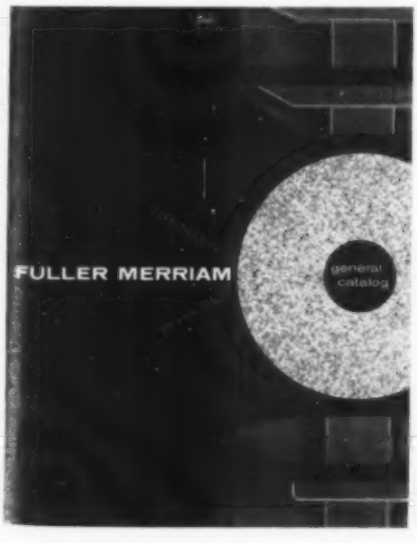
Use postpaid card. Circle No. 3

Air Cleaner

The Logan Aridifier is a mechanical cleaner that removes 92% of oil, moisture and dirt from compressed air lines to protect pneumatic tools and equipment. Employing centrifugal force, the unit has baffles and vanes to trap contaminants in the air line. No maintenance other than occasional cleaning of the trap section of the unit is required.

Logan Engineering Co., 4901 W. Lawrence Ave., Chicago 30, Ill.

Use postpaid card. Circle No. 4



FREE LITERATURE *continued*

Snagging Wheel

The Sterdense snagging wheel, for stand and swing frame casting grinding, has extra-dense, compact bond to hold the sharp abrasive grains firmly and rigidly until all their cutting value has been used. Cooler-grinding, longer lasting abrasive unit readily adapts itself to varying job demands.

Specifications of foundry wheel can be custom-built to special needs. Self-dressing action results in faster grinding, longer life.

Folder from Sterling Grinding Wheel Co., Tiffin, Ohio.

Use postpaid card. Circle No. 5

Barrel-Finishing Laboratory

Brochure conducts the reader on a pictorial tour of large modern precision barrel-finishing laboratory. Here sample parts are sent to be processed to specifications. A picture-caption sequence traces each step, from the time a part arrives until it is returned to the manufacturer. Laboratory also formulates compounds for special processing needs, tests chips and other media in practical use, designs, develops and tests barrels and other new equipment.

Lord Chemical Corp., 2068 S. Queen St., York, Pa.

Use postpaid card. Circle No. 6

Hardness Chart

A new desk-size chart containing conversion data for Rockwell tests and other hardness scales is available from The Torsion Balance Company. In addition to hardness conversion, this chart also has tables for cylindrical corrections.

Torsion Balance Co., Clifton, N.J.

Use postpaid card. Circle No. 7

Engineering Timesavers

"Timesaving Tips for the Draftsman and the Engineer" is the title of a new booklet offered by Frederick Post Company, Chicago. A total of 59 interesting tips and drafting shortcuts are described and illustrated in the 40-page handbook. Post surveyed 52 leading engineering and drafting firms to round up the techniques presented. A section of Calculating Ideas contains 10 tips, while the book includes 22 drafting shortcuts, 9 engineering data tips, 10 board timesavers.

Frederick Post Co., 3650 N. Avondale Ave., Chicago 18, Ill.

Use postpaid card. Circle No. 8

Continuous Blasting

Descriptive bulletins on four new Wheelabrator Continuous Tumblasts, airless abrasive blast cleaning machines, are announced by Wheelabrator Corporation. They cover the 15", 36", 48", and 60" Continuous Tumblast with the new end-discharge construction in which work to be cleaned passes through the machine at a continuous rate. No operating labor is required for these high production blast cleaning machines. Diagrams, line drawings, and cutaway illustrations combine with informative copy to tell the complete story for each model. Bulletin 136-D on the 15" Continuous Tumblast, Bulletin 131-D on the 36" model, Bulletin 133-D on the 48" model and Bulletin 110-D on the 60" model.

Wheelabrator Corp., 1169 S. Byrkit St., Mishawaka, Ind.

Use postpaid card. Circle No. 9

Your Spindles SERVICED or REBUILT in HOURS ...not weeks

Here's your spindle ready for reassembly. New super precision bearings from our complete stock of all types of spindle bearings are installed. We've cleaned and checked every part of this spindle for misalignment and flaws—It's ready to go back together for a series of exacting "run-in" tests to make certain the dirty, worn out spindle we received just hours ago is returned to you ready to perform as well or better than it did when the spindle was new!

Gentlemen:

I'd like to have complete information on your spindle repair service.

Name .....

Firm .....

Address .....

City..... Zone..... State.....

BEARINGS, INC.

3640 EUCLID AVENUE • CLEVELAND 15, OHIO

OHIO: Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton • Lima • Mansfield • Toledo • Youngstown • Zanesville

INDIANA: Ft. Wayne • Indianapolis • Muncie • Terre Haute

PENNSYLVANIA: Erie • Johnstown • Philadelphia • Pittsburgh • York

WEST VIRGINIA: Charleston • Huntington • Wheeling

NEW JERSEY: Camden • MARYLAND: Baltimore

DELAWARE: Wilmington •

Subsidiaries: Balanrol Corp. • Buffalo, N. Y. •

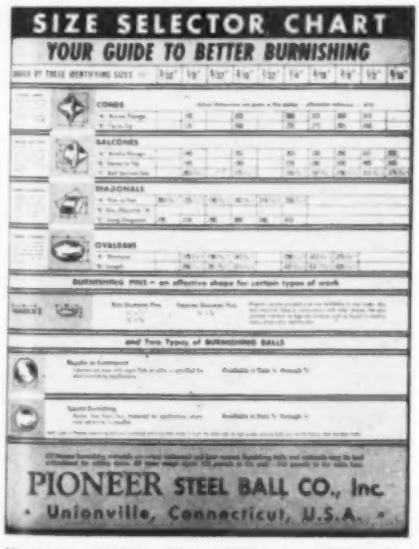
Use postpaid card. Circle No. 229

Hardness Tester

Four page folder describing portable 30-ounce instrument which can be used in any postion to test the hardness of any size, shape or type metal has recently been issued by Newage Industries, Inc. Tester is described as eliminating the need for calculations or conversions since the operator places the unit on the metal, presses the handles toward the material and reads the large dial to get an accurate answer in seconds in Rockwell or Brinell ranges. The need for clamps, jaws and base plates is eliminated.

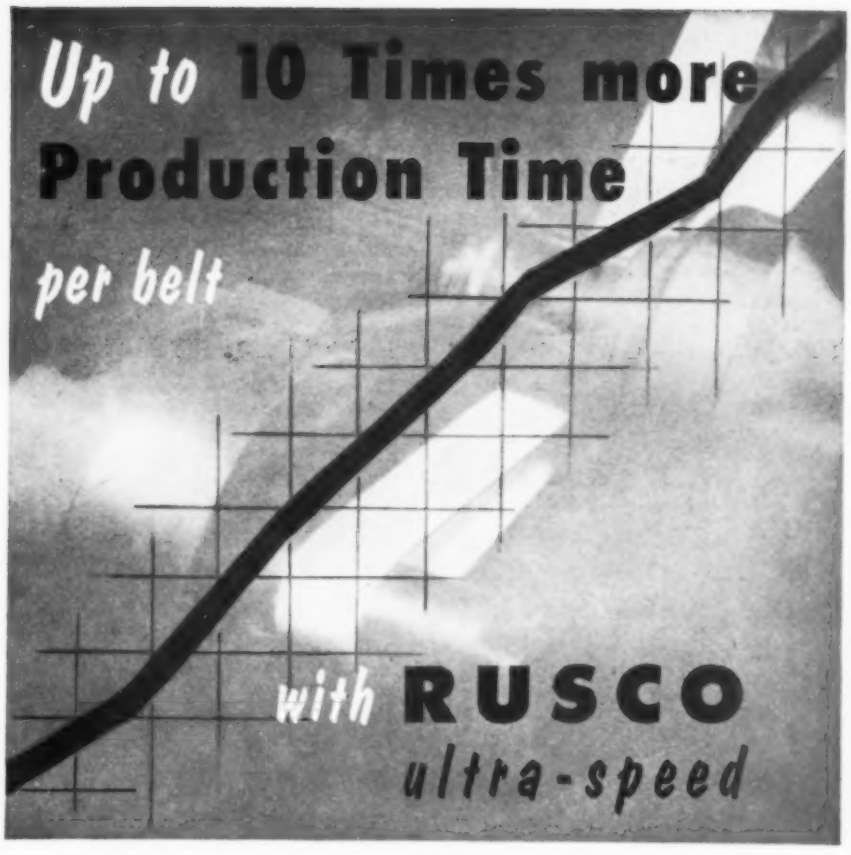
Newage Industries, Inc., 222 York Road, Jenkintown, Pa.

Use postpaid card. Circle No. 10



"YOUR GUIDE TO BETTER BURNISHING," new 12 x 15 two-color wall chart offered by Pioneer Steel Ball Co. Illustrations include burnishing cones, balcones, diagonals, ovalbals, and pins. Chart indicates actual dimensions of these metallic burnishing materials. Printed on stiff cardboard, chart is suitable for hanging in production departments, will be especially useful to supervisors and others in barrel finishing departments. Pioneer Steel Ball Co., Unionville, Conn.

Use postpaid card. Circle No. 11



Performance records almost beyond belief are being reported by Ultra-Speed users across the country. As a replacement belt on high speed equipment, Rusco Ultra-Speed lasts as much as 10 times longer than all other flat belts of comparable size.

Design engineers are recognizing Rusco Ultra-Speed as the key to spindle speeds of 100,000 rpm and over—the one belt that can withstand the tremendous centrifugal forces exerted at ultra high speeds . . . the one belt that withstands the severe flexing action of small diameter pulleys.

Developed by Russell, Ultra-Speed introduces a whole new concept of performance and economy in high speed transmission.

Prove it Yourself

We invite you to put Rusco Ultra-Speed to work on your most difficult high speed drive. Prove its superiority yourself. If it does not outwear the belt you are now using, your full purchase price will be refunded.

Contact your local **RUSCO** distributor, or send this coupon for detailed information.

THE RUSSELL MANUFACTURING CO.

ENGINEERED FABRICS SINCE 1834

115 East Main Street • Middletown, Conn.

Please send me full information about Rusco Ultra-Speed.

Name _____ Title _____

Company _____

Address _____

Use postpaid card. Circle No. 230

FREE LITERATURE *continued*

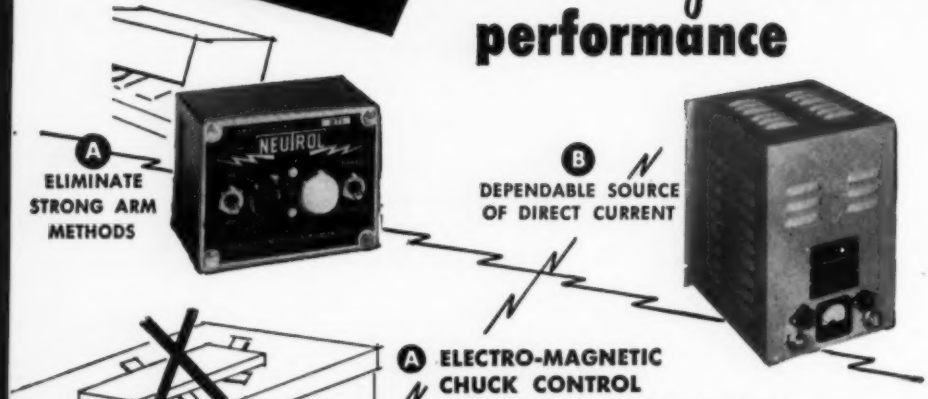
Safety Check List

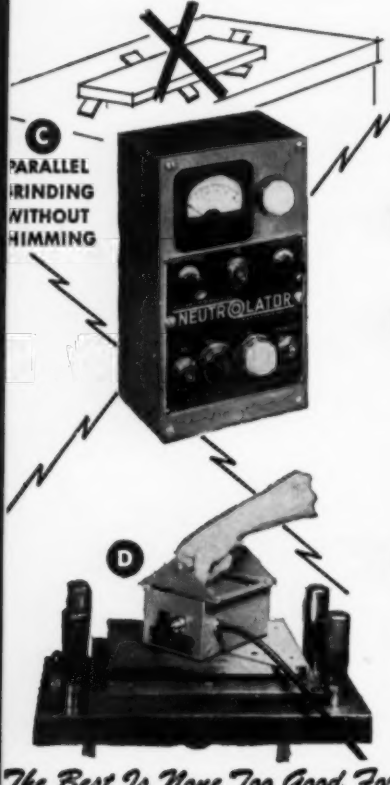
To locate the hidden probabilities of electrically ignited explosions in plants, a "Hazard Finder" is being made available by Crouse Hinds Company of Syracuse, N. Y. Eight-page illustrated folder contains a check list of 13 questions that can help you determine whether uncontrolled flammable gases, vapors, dusts, liquids and other combustible materials are making your plant unsafe. Part of the folder is sealed until all the questions have been answered. After the seal is broken, an evaluation of the hazard potential in your plant is revealed, based on your answers and the findings of the National Fire Protection Association.

Crouse Hinds Co., Wolf & Seventh North Sts., Syracuse, N. Y.

Use postpaid card. Circle No. 12

electrical controls for Full Magnetic Chuck performance





A ELECTRO-MAGNETIC CHUCK CONTROL
Releases and demagnetizes work pieces simultaneously. No time lost. No damage to work or chuck face. Protects chuck from voltage surges. Speeds production. Chuck capacities: 50 to 15,000 Watts . . . 60 to 20,000 square inch chuck area.

B ELECTRO-MATIC RECTIFIER
Power conversion Unit, proved for dependable use with Magnetic chucks and other direct current equipment, from 50 Watts to 40 Kilowatts.

C NEUTROLATOR HOLDING POWER REGULATOR AND CHUCK CONTROL
Provides regulation of holding power which permits grinding without shimming, to closer parallelism than ever before possible. In production grinding where holding power must be the same with each work piece, Neutrolator reproduces the same tension on successive pieces without readjustment. Where various tensions are required, a simple dial or push-button control provides regulation of holding power.

D ELECTRO-MATIC A.C. DEMAGNETIZER
Demagnetizes dies, punches, cutters, tools that have been magnetized from any source. Works by simple contact. Operates on standard A.C. voltage. Will not overheat through constant use. A size for every purpose.

The Best Is None Too Good For Your Cutting Tools And Dies

ELECTRO-MATIC PRODUCTS CO.

2235-37 N. Knox Ave. Chicago 39, Ill. (U.S.A.)
Telephone: BElmont 5-4010

Use postpaid card. Circle No. 231

Hand Stoning

An illustrated 24-page handbook on hand stoning tells how better finishes can be obtained and cutting tool life increased with the proper abrasive stone. The booklet lists and describes the scores of special shapes, types and sizes available, either in natural stones or those manufactured in electric furnaces. It offers guidance particularly to tool and die makers, machinists, model builders and instrument makers.

Behr-Manning Co., Troy, N.Y.

Use postpaid card. Circle No. 13

Oxide Cutting Tools

Stupalox high-strength oxide-base cutting tools are detailed in a new 12-page catalog, No. 257, published by Stupakoff Division of The Carborundum Company. In addition to technical description and a table of physical properties, the bulletin lists tool holders, and dimensions and prices of Stupalox throwaway inserts, solid inserts and unground blanks.

Stupakoff Division of The Carborundum Company, Latrobe, Pa.

Use postpaid card. Circle No. 14

Hydraulic Cylinders

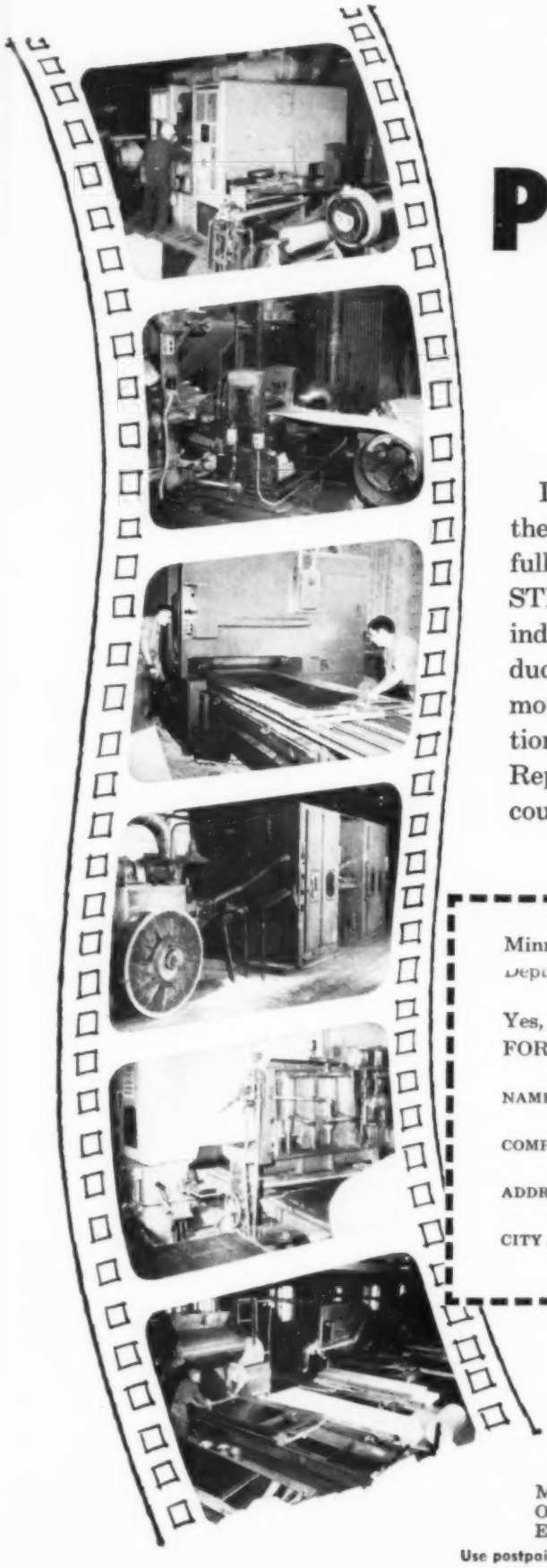
Bulletin No. 57-68 shows recent improvements in design and additional mountings for Vickers "Compact" Hydraulic Cylinders. The new bulletin provides detailed information on the construction and features of Vickers 2000 psi cylinders, including the new trunnion-mounted cylinders. Complete tables of sizes and dimensions and useful engineering data on application, mounting, piston areas and speeds, cylinder cushion lengths, and circuits are also included.

Vickers, Inc., Detroit 32, Mich.

Use postpaid card. Circle No. 15

Announcing an important new motion picture for

Primary Metal Industries



If you manufacture, process or fabricate *any* of the primary metals, you'll want to see the brand new full-color sound movie, "A CHALLENGE FOR STEEL", prepared especially for the primary metals industry by the 3M Company—world's largest producer of industrial coated abrasives. You'll find this movie packed with cost-saving tips, helpful information about coated abrasives. Contact your 3M Representative today for a free showing. Or send coupon below.

Minnesota Mining and Manufacturing Co.
Dept. 10-87, St. Paul 6, Minnesota

Yes, I want to see your primary metal movie "A CHALLENGE FOR STEEL". Have a 3M Representative contact me right away.

NAME . . . . . TITLE . . . . .

COMPANY . . . . .

ADDRESS . . . . .

CITY . . . . . ZONE . . . STATE . . . . .

3M COMPANY

Made in U.S.A. by MINNESOTA MINING AND MFG. CO. General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export Sales Office: 99 Park Avenue, New York City.

Use postpaid card. Circle No. 232

FREE LITERATURE *continued*

Vacuum Cleaning Equipment

Four-page supplement, Form M-135, contains a detailed, illustrated description of the Hoffco-Vac "35" high vacuum portable cleaner. The streamlined design of this unit, which weighs 650 lbs. and is 32 inches wide, permits its handling over uneven floors and through narrow aisles by only one person. It was developed for non-stop operation on heavy dust deposits, with hose lengths up to 75 feet, 9 dust bags which supply 30 square feet of effective cloth area, and powered by a 5 hp motor plus a v-belt driven exhauster.

U.S. Hoffman Machinery Corp., 105 Fourth Ave., New York 3, N.Y.

Use postpaid card. Circle No. 16

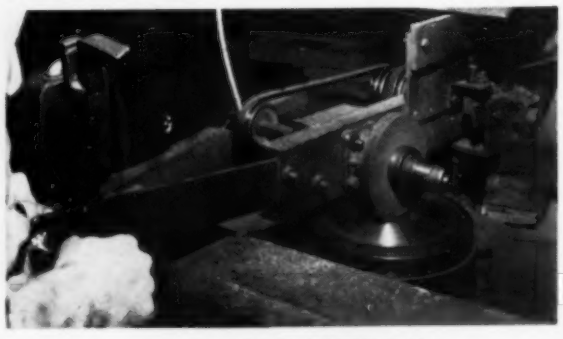
Barrel Finishing Compounds

Two-page folder has just been released by the Esbec Barrel Finishing Corp., covering specifications and application information on fourteen different Esbec color-coded compounds and abrasives. Compound-use chart included in the folder is a quick, handy reference for determining recommended compound types for various materials and different finishing operations.

Esbec Barrel Finishing Corp., 18 Beech St., Byram, Conn.

Use postpaid card. Circle No. 17

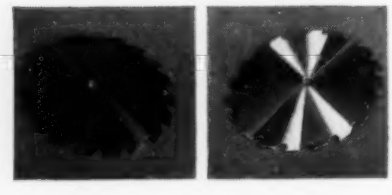
FOR HEINEMANN SAWS—



how HEINEMANN does it!

Saw blades are taken rough ground from surface grinders. They are placed on the magnetic rotating plate. The Brightboy Wheel oscillates back and forth across the surface of the saw.

"a mirror-like BRIGHTBOY Finish, unobtainable by any other form of polishing"



BEFORE AFTER

Heinemann Saw before and after Brightboy polish.

The FINISHING Touch!

"The eye-appeal provided by Brightboy's unique working action plays an important part in selling our saws", says Mr. William Heinemann of nationally-known Heinemann Saw Corporation, Canton, Ohio. "It produces the superb finish which reflects the high skill of our craftsmen and our use of finest materials."

FOR MANUFACTURE & MAINTENANCE OF MANY TYPES OF TOOLS

A Single-Step BURRING, FINISHING, CLEANING, POLISHING OPERATION

Brightboy's ABRASIVE & RUBBER work simultaneously to achieve this 4-in-1 operation. Stock Brightboy numbers are match-mated to the tool and steel for any requirement of finishing. A Brightboy finish frequently constitutes the final polish.

Readily Available: A WIDE RANGE OF STOCK BRIGHTBOY SHAPES, SIZES & TEXTURES

Wheels, sticks, rods and blocks for machine and manual operations come in Silicon Carbide and Aluminum Oxide grains from extra fine to extra coarse. Soft, firm, and tough rubber binders.

Practically limitless applications bring an entirely new, wider concept of abrasive uses. Ask your dealer for Brightboy's catalog listing grains, textures, applications, machine speeds. Write us if he cannot supply you or on any problem in which finishing is involved.

WELDON ROBERTS Brightboy RUBBER CUSHIONED ABRASIVES

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
95 North 13th Street Newark 7, N.J.
America's Pioneer Manufacturer of Rubber-Bonded Abrasives

Use postpaid card. Circle No. 233

Anderson
BRUSHES for INDUSTRY

Industrial Brushes

New 22-page catalog gives details on complete line of wire brushes for industry. Especially color-coded to simplify brush selection, detailed specifications are presented quickly and clearly, along with numerous tables of helpful information useful to brushing applications.

Anderson Corp., Worcester, Mass.

Use postpaid card. Circle No. 18

Diamond Compound

Brochure gives specifications of diamond powder and compounds. Powder is guaranteed free of fines and oversize particles and conforms to the provisions of the U. S. Bureau of Standards for purity, uniformity and sizing. Applications for the various grades of powder and compounds are given in the listing. A diamond reclaiming service is also described.

Diamond Dust Co., Inc., 15 W. 44th St., New York 36, N.Y.

Use postpaid card. Circle No. 19

Descaling

"Here's $7 You Might as Well Have" is an 8-page booklet on mechanical descaling of steel which has been published by Wheelabrator Corporation, 1169 South Byrkit Street, Mishawaka, Ind. Booklet contains a brief discussion of the alternatives open to steel users for obtaining the required cleaned steel and gives a detailed description of how one plant has saved $7 a ton on steel costs. This saving represents the difference in price previously paid for pickled and oiled stock from the mill and the cost of mechanically descaling steel with a Wheelabrator cabinet in the user's own plant. The booklet also points up the principle of mechanical descaling.

Use postpaid card. Circle No. 20

Grinding and Finishing

New Equipment and Materials

For further information on any of the products listed here, use the handy postpaid card opposite page 65.

Improved Visual Grinder Introduced by Cleveland

Continuous lubricating system, timer belt, 110 volt electrical control, closer tolerance downfeed control, and several other improvements are incorporated into the new model VG-3 Visual Grind manufactured by The Cleveland Grinding Machine Company.

Visual Grind permits the form grinding of steel and tungsten carbide to precision tolerances without stopping to consult a comparator. The new model was first shown at an international trade show in June, and is now being shipped. Improvements in the machine will facilitate continuous grinding and work inspection of intricate forms by through, blind and combination grinding methods.

Since this is accomplished by projection of the work-piece on a ground glass viewing screen with magnification systems ranging from 10:1 to 100:1, and the work-piece is ground and simultaneously inspected on the viewing screen enlargement, the downfeed control in the new Visual Grind is graduated to tenths.

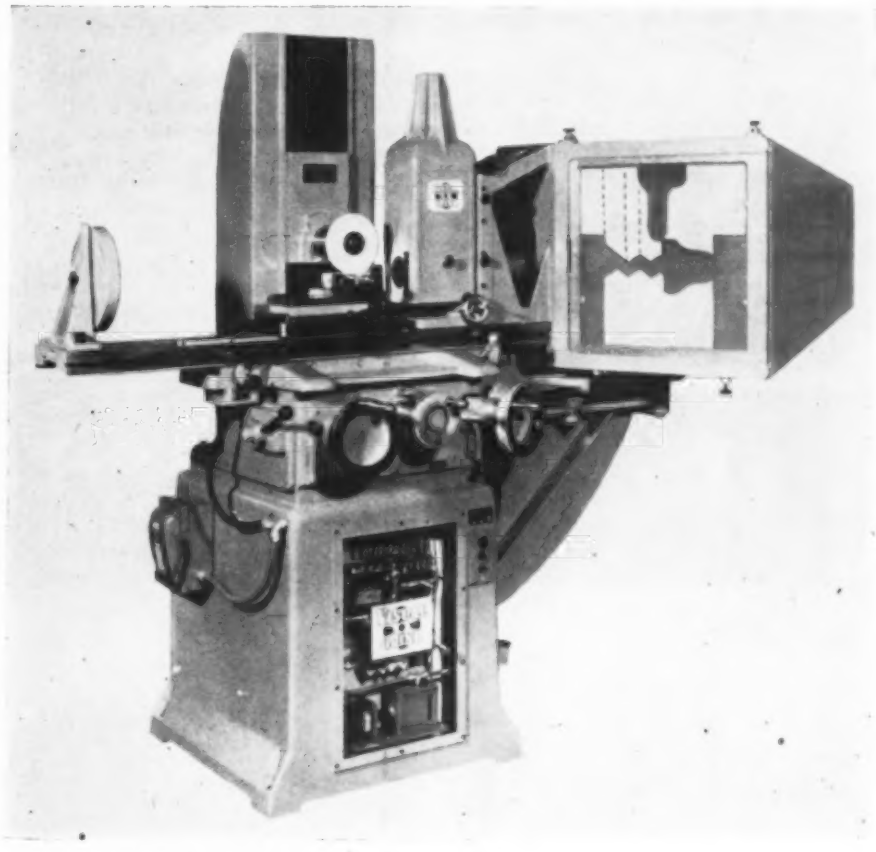
The new continuous lubricating system is a low pressure rotary pump so there will be a constant film on machine ways. Previously Visual Grind used a one-shot system.

To give a smoother finish to the work-piece, the VG-3 has a nylon oil protected timer belt instead of the usual chain. A 110 volt electrical control operating from 220 or 440 volts has been installed to replace the direct 220 or 440 volt model.

Other features of the new Visual Grind include improved dust protection and 110 volt transformer to operate working light. The Visual Grind can grind numerous forms using only a few select wheels.

Cleveland Grinding Machine, 1610 Eddy Road, Cleveland 12, Ohio. •

Use postpaid card. Circle No. 101



VG-3 Visual Grind form surface grinder.

Improved Barrel Finishing Compound

The Esbec Barrel Finishing Corp. announces a completely new development in the field of barrel finishing compounds. Esbec No. 234, a neutral, powdered, non-abrasive compound is the product of a long development program.

The outstanding property of Esbec No. 234 is its ability to replace acid compounds and so to eliminate the necessity for a subsequent neutralizing operation, combined with unusual burnishing ability. It thus overcomes all the objections associated with acid compounds. It is said to: (a) Remove rust, oxide stains, and light heat treat scale. (b) Remove the gray film left

after long runs in aluminum oxide chips in preparation for burnishing. (c) Produce amazing fast burnishing results (15 to 45 minutes) with small chips of steel burnishing media. (d) Recondition steel burnishing media, removing films which prevent good results and restoring lustre, usually in a 50 minute run.

Only 2 to 3 ounces are required per gallon of water.

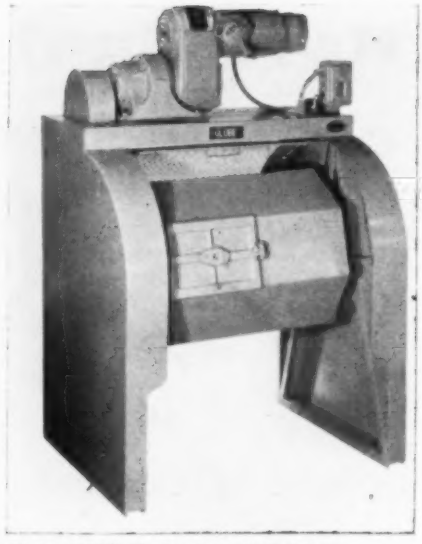
The Esbec Barrel Finishing Corp., 18 Beech St., Byram, Conn. •

Use postpaid card. Circle No. 102

Barrel Finisher for Short, Medium Production

Globe 3000 Series Burr-Rite, Sr. is designed for small to medium large production runs. It affords the advantage of doing up to four operations at one time, or process up to four large precision parts at one time in individual compartments for such processes as deburring, grinding, polishing, burnishing and deflashing.

Features of the 3000 Series Burr-Rite, Sr. include free-swinging safety screen with no troublesome channel which is easily damaged; lightweight

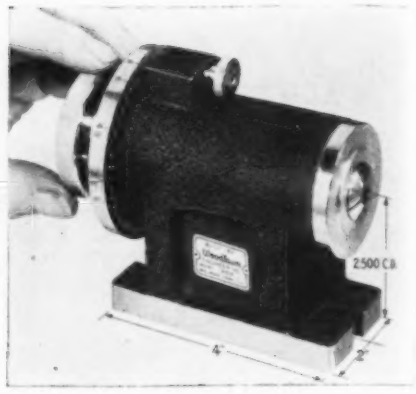


Globe 3000 Series barrel finisher.

aluminum door with quick-acting latch to allow faster loading, unloading; ¼-inch abrasive-resistant bonded neoprene lining; manually operated forward and reverse drum switch for easy operation; extra-strength A-frame design.

Casalbi Co., 540 Wayne St., Jackson, Mich. •

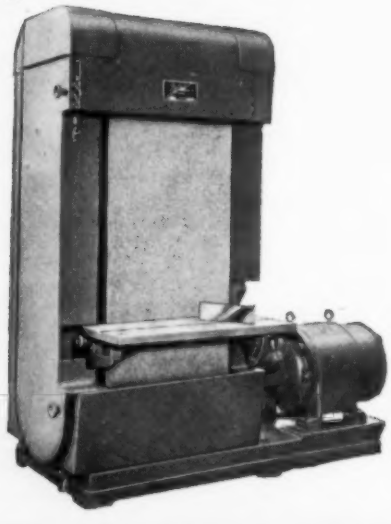
Use postpaid card. Circle No. 103



INDEXING HEAD—Small, low cost, easy-to-handle indexing head, precision made to meet a long standing need of tool makers and machinists. Specifically designed for precision indexing—offering the following advantages: (1) No lost motion in wheel dressing, (2) Ease of handling between grinder and surface plate, (3) Uses standard type 3C collets, (4) Rotary action can be locked in any position, (5) Choice of 48, or 40 hole indexing plate, (6) Keyway in base for milling setups. Priced at $110.00 for combination package, including index head, mahogany case and set of seven collets (⅛ through ½ in.). Index head alone, $69.50. Woodlawn Engineering Co., 2200 N. Mannheim, Melrose Park, Ill.

Use postpaid card. Circle No. 104

Production CENTERLESS GRINDING & FINISHING MACHINES



PEERLESS WIDE BELT SURFACER . . .
for wood, plastic and metal

In addition to centerless machines, Production Machine Company also makes the famous Peerless Abrasive Belt Surfacers.

Of heavy duty construction throughout, these machines are built to operate continuously on all types of platen grinding, sanding, and surfacing jobs using abrasive belts. Available in vertical type as illustrated with work table and miter gauge adjustable for angles to 45°. Horizontal type has moveable work stop and may be adjusted to any position on the platen.

Made in three sizes for belts 9", 14", or 20" wide. Write for bulletin with full specifications. Dept. F.

PRODUCTION MACHINE CO. Greenfield, Mass., U.S.A.

Use postpaid card. Circle No. 234

Semi-Automatic Internal Contour Grinder

Introduction of the Parker-Majestic Semi-Automatic Internal Grinder made possible the development of an internal cam form grinder.

The heart of the new machine is a cam follower workhead wherein a cam and cam follower are installed at both ends of the head. This prevents any possible twist or bind and insures smooth follower action.

A cam is used to control the grinding wheel in-feed. When rotated by means of a ratchet mechanism through 360°, the cam completes a cycle consisting of rapid in-feed for roughing, dwell for wheel dressing and finally a slow in-feed for finishing.

Sizing is accomplished through the use of a micrometer type wheel dresser which, when once positioned, enables

Semi-automatic internal grinder is readily converted to an internal cam form grinder.

each succeeding work piece to be repetitively identical.

Table movement is energized by any one of three built in methods:

1. Hand feed using the capstan type hand wheel.

2. Power feed through a gear driven mechanism electro-mechanically controlled for the full table travel of 12".

3. Reciprocator mechanism where the stroke is adjustable from 0 to 3".

The third method appears most effective for the majority of applications thus far encountered.

It is a simple matter to change workhead cams, permitting the grinding of many different internal forms. This feature is particularly desirable when relatively short run production on several parts is demanded.

Parker-Majestic, Inc., 147 Joseph Campau, Detroit 7, Mich. •

Use postpaid card. Circle No. 105

Honing Attachment

The Unahone makes a honing machine out of almost any revolving spindle that will accept taper or straight shank tools. The amount of stock removal is determined by the amount of drag put on the adjusting sleeve. Hole sizes to tenths and surface finishes of practically any desired quality can be achieved through its use, the manufacturer claims. Descriptive folder available.

The Dow Mechanical Corp., Thompsonville, Conn.

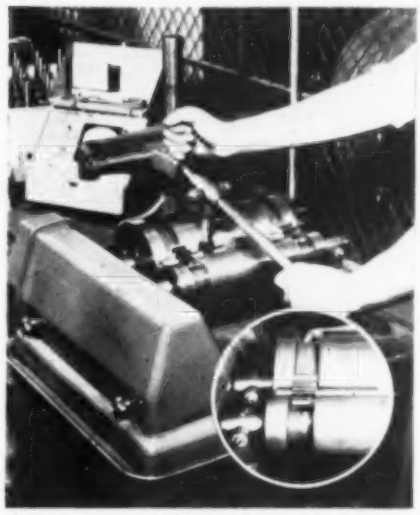
Use postpaid card. Circle No. 106

Contour Cut-Out Rollers for Cylindrical Lapping Machines

The Spitfire Tool Company, Chicago, is now delivering cylindrical lapping machines with custom made contour cut-outs built into rollers to provide greater speed and accuracy for lapping cylindrical piece parts with shoulders or other angular obstructions.

This new approach to cylindrical lapping of piece parts was developed to answer the needs of manufacturers requiring precision lapping on large quantity runs. Instead of "balancing" each cylindrical piece part on the lapping roller to lap journals and other cylindrical projections, Spitfire's contour cut-outs permit the part to be literally dropped into the correct position for lapping. Time saved and accuracy gained total to important factors.

Contour cut-outs are engineered into rollers according to specifications of individual piece parts. However, Spitfire rollers incorporating these cut-outs



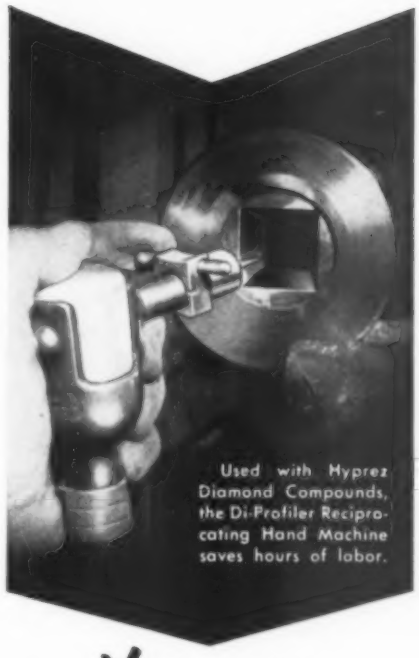
Cutouts in lapping rollers permit finishing of irregular parts.

can also be used for lapping, roughing and finishing of other cylindrical piece parts.

Rollers and their sleeve bearings remove as a single unit merely by loosening a set screw at either end. No testing or gauging is necessary. Set screws are simply threaded to tightest position and the new roller is known to be in correct position for accurate operation.

Spitfire Tool Company, 2931 North Pulaski Road, Chicago 41, Illinois. •

Use postpaid card. Circle No. 107



You can save money, muscle, and finishing time with

HYPREZ DIAMOND COMPOUNDS

Hyprez Diamond Compounds assure uniform performance and predictable results — as well as increased production from your dies, molds and tools. Your nearby Hyprez distributor will help you solve any difficult finishing problem.

Ask for a Free Demonstration or Technical Bulletin No. G-87

HYPREZ DIVISION
ENGIS EQUIPMENT CO.
431 S. Dearborn Street, Chicago 5, Illinois

Use postpaid card. Circle No. 235

Are You Looking For An Editorial Opportunity To Improve Your Future?

IF —*you know the field of abrasive processes and production methods;*

—you have a knowledge of writing;

—you can assume responsibility; and,

—you want an opportunity to build a future in the publishing field,

. . . here is your chance.

HITCHCOCK PUBLISHING COMPANY, one of the nation's leading publishers of business papers since 1898, presently has this outstanding editorial opportunity available and is planning a new expansion program which is creating several editorial positions.

If you're interested in an editorial future, this is your opportunity. You will find the best of benefits and working conditions at HITCHCOCK.

Write for an interview and include your resumé, in strict confidence, to:

William F. Schleicher

Vice-president & Editorial Director

HITCHCOCK PUBLISHING COMPANY

222 East Willow Avenue
Wheaton, Illinois

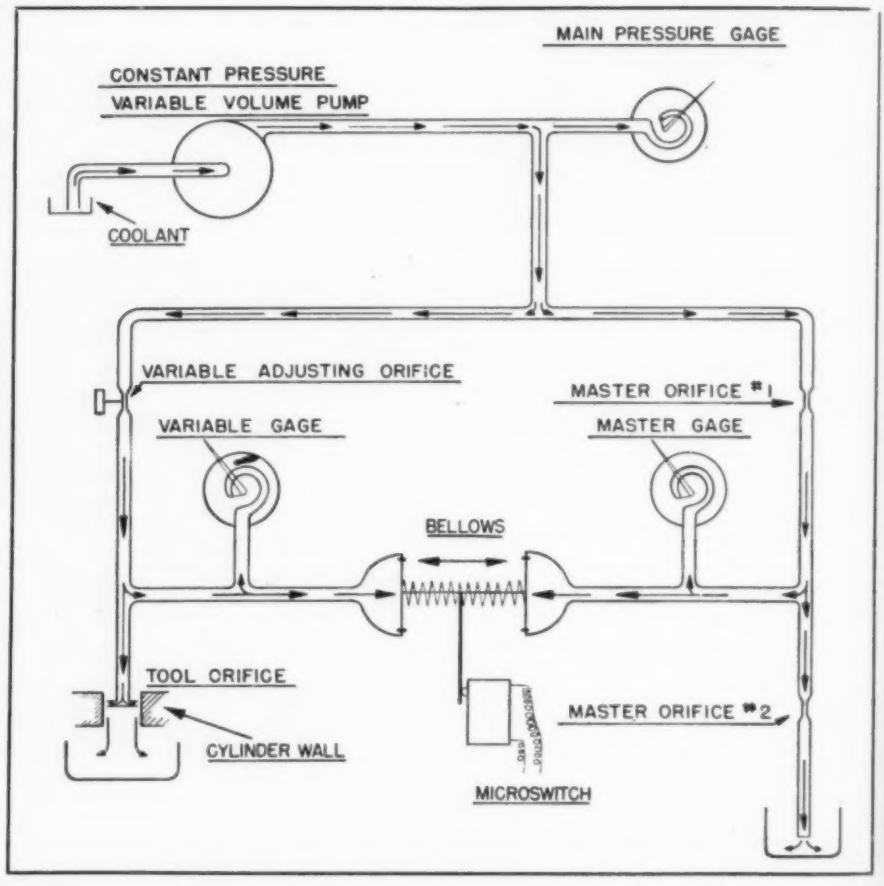
Barnesdril Develops Liquid Sizing for Accurate Honing

Barnesdril honing engineers have developed an improved method for sizing honed bores as a part of the honing cycle. Referred to as Liquid Sizing, this method automatically gages the diameter of honed bores throughout their full length as honing progresses.

Actual sizing is accomplished by a metering liquid directed against the cylinder wall, through orifices in the honing tool, until it reaches a preselected pressure point. As honing progresses, the bore increases in size, causing the pressure to decrease. A micro-switch then terminates the honing machine cycle, permitting the tool to complete the stroke and withdraw from the bore.

A number of applications of the liquid sizing development are successfully at work in industry, the most recent of them in the multiple-bore honing of a V-8 engine block in a Detroit automotive plant.

Filtered coolant fluid is pumped into a manifold under constant pressure and from there to a hydraulic bridge network. A hydraulic bridge consists of two master orifices and one variable orifice, with a second variable orifice a part of the honing tool. See schematic. The differential pressure between the master orifices and the variable orifices



SCHEMATIC SHOWS HOW Barnesdril Liquid Sizing supplies coolant at constant pressure to both the tool and the master gage. Back pressure, created by forcing coolant between the tool and walls of cylinder, affects the expansion of the bellows. As honing progresses, the distance between the tool and the wall increases, causing back pressure to decrease and the bellows to expand, until the point is reached where this variable pressure balances with the pre-set pressure on the master gage. At this point, a micro-switch is tripped to conclude the honing machine cycle, with the honing tool continuing for one full additional stroke. If at any point the bore is not to size, the micro-switch reactivates the cycle and honing continues until the entire bore is to size.

Johnson's major contribution to coolants fits today's high-speed production needs!

Coolants were just coolants for 50 years until Johnson's Wax Research developed formulations using *waxes* and *wax-type synthetics*. Johnson's Metalworking Fluids are as modern and efficient as your 1957 machine tools. They give you superior performance even on your toughest jobs — because Johnson's lubricates and cools under conditions where ordinary coolants fail because of extreme heat and pressure.

Use Johnson's on your fastest machines, with your hardest-to-machine metals, and compare results obtained with conventional coolants. In hundreds of shops across the country, Johnson's coolants for machining, cutting and grinding are reducing costs and increasing profits.

Your local Johnson's industrial distributor will be glad to set up an in-your-shop test of TL-131 — or any of the complete line of Johnson's Metalworking Fluids. Ask him about Johnson's money-back *Guarantee of Superior Performance* over ordinary coolants.

from
Johnson's Wax Research

S. C. Johnson & Son, Inc., Industrial Products Division, Dept. D-57, Racine, Wisconsin

"Johnson's" is a trademark of S. C. Johnson & Son, Inc.

Pictured below is Johnson's TL-131, one of a complete line of modern coolants for today's high-speed grinding.

BARNESDRIL
#2 Magnetic Separator installed on a cylindrical grinder.

coolant separator increases production 15%

pays for itself in less than 9 months

Automatically separating ferrous particles from coolant with a #2 BarnesdriL Magnetic Separator and recirculating it, has produced a saving of $20.00 per week* on this cylindrical semi-automatic grinder.

Benefits such as improved finish, less downtime and less coolant waste were immediately noticeable. Additional benefits, such as the reduction of dermatitis and increased operator comfort, were noted only after the coolant separator was in operation some time.

These benefits are typical of the savings and benefits accrued when a BarnesdriL separator is installed. Call your BarnesdriL Factory Representative today or write for Catalog 300D.

*** SAVINGS PER WEEK:**
3¾ hrs Cleaning Time
3¾ hrs Operator's Time
1.87 gals. Coolant
25% Wheel Life

FILTRATION DIVISION

50th year

BARNES DRILL CO.

986 CHESTNUT STREET • ROCKFORD, ILLINOIS
DETROIT OFFICE: 3419 South Telegraph Road

Use postpaid card. Circle No. 310

BARNESDRIL PLATE-TYPE Honing Tool showing orifices from which coolant is metered.

is sensed by a pressure switch. When these pressures are equal a microswitch is actuated by a pressure switch thus indicating a "to size" condition. It should be noted that a full stroke is required to react to the size condition due to a timer which is included in the system. The hydraulic bridge system is used because variations in viscosity, temperature and line pressure can be effectively cancelled by the inherent nature of the bridge system. This gives great stability of setting of size designed for a given size tool orifice. The advantage of being able to vary size within a range of .005 inch can be achieved. This is done by changing the orifice in the manifold.

Liquid Sizing offers several advantages not found in other methods of gaging honed bores. Coolant is flooded over the cylinder walls at the most critical point during the honing cycle, thus better heat control is effected. This also provides continuous flushing which materially increases the stone life and provides better micro-finish control.

Additionally, new Barnesdril Plate Type honing tools are utilized. These new tools are constructed for low tool maintenance and make stone replacement easier.

Barnes Drill Co., 886 Chestnut St., Rockford, Illinois. •

Use postpaid card. Circle No. 108

Electronic Comparator for Gage Block Users

Cleveland Instrument Company has recently announced a new Micro-Ac electronic comparator for ultra precision gaging by users of gage blocks. The new amplifier and gaging stand is designed for laboratory precision and is rugged enough for production use—measurements to one-millionth of an inch are simple and can be made with a minimum of skill. It is recommended for use where maximum accuracy and reliability is required, such as gage block calibration, thread wire, servo pistons, balls, etc.

According to the manufacturer, use of the new Model MA-1720 Micro-Ac Microcomparator eliminates delays inherent in out-of-plant calibrating; increases utilization factor of present gage block sets; reduces calibration and inspection cost; insures properly calibrated blocks at all times; reduces total gage block investment.

A gage head, amplifier and stand make up the complete microcomparator. Dimensional changes at the gage tip are displayed on the meter magnified up to 100,000 (10 millionths of an inch change moves the meter pointer one inch). In use, the gage head is zeroed to the master dimension. The meter then shows how far off-size the gage block, or part, is from the master dimension.

All controls are designed and located

Cleveland Micro-Ac comparator for extreme accuracy.

for ease of adjustment and operator convenience. A full line of accessories is available which covers every type of special high precision measurement.

Cleveland Instrument Co., 735 Carnegie Ave., Cleveland 15, Ohio. •

Use postpaid card. Circle No. 109

Germicide for Coolants

F. E. Anderson Oil Company, Inc. have introduced a new germicide, Winsor G-6, which is claimed to be the first truly effective germicide for water based coolants. Winsor G-6 Germicide accomplishes positive killing of bacteria and eliminates unpleasant coolant odors. Intensive experimental research in the Anderson laboratories and in the field have confirmed the greatly increased effectiveness of this new germicide. Copies of an independent laboratory's bacteriological report, showing results of an actual field test, are available on request.

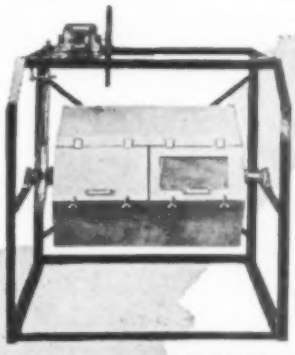
F. E. Anderson Oil Co., Inc., Portland, Conn. •

Use postpaid card. Circle No. 110

Your Key to
BETTER FINISHING

Only KRAMER's
Tumblers and Buffers give you SUCCESSFUL PRECISION FINISHING with high savings.

Yes! Kramer's Noiseless, chain-driven Tumblers CUTS DOWN YOUR LABOR COST . . . DEBURRS, DEFLASHES, POLISHES to give you the "PERFECT FINISH LOOK" desired to meet your highest standards.



SINGLE BARREL TUMBLER

Size: 30" x 36" or engineered to your specifications. Barrels lined with kiln-dried and glued maple. Child's play to operate. Economical on space as motors are individually mounted overhead—double decked or single. Tumbling supplies available also.

BUFFING LATHE

1 to 7½ H.P. Ball Bearing V-Belt Drive. Pre-determined speed set at factory or to your specifications. Buffing wheels and compounds available for every industry . . . Special compounds recommended for Special applications.

Write Dept. GF for Detailed Information

H. W. KRAMER CO.
120-30 JAMAICA AVENUE
RICHMOND HILL 18, N. Y.

Use postpaid card. Circle No. 237

Make accurate set-ups *faster* with this
25° Tilting Spindle

The STERLING Model "G-2" Universal Tool and Cutter Grinder provides this extra feature plus complete versatility and more capacity than comparable machines at *lower cost.*

Swing 10¾" over table, 27" between centers, 18" table travel with 8¼" cross feed. For complete details and specifications write for FREE Bulletin "G-2".

Grind 90° to 140°

Included Angle on *ALL DRILLS*, ⅛" to 2½"

No collets or chucks makes set-ups easy. Clearance gauge insures accurate, positive clearance angle. True conical grinding produces full clearance from center to outside. Write for FREE Bulletin "DV-1".

McDONOUGH MFG. CO.

1522 GALLOWAY • EAU CLAIRE, WISC.

Use postpaid card. Circle No. 238

Precise POWER QUILLS

CUT ASSEMBLY TIME 55%

AT ALLIED CONTROL CO.

PLANTSVILLE, CONNECTICUT

Case History M-100

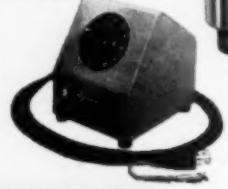
PROBLEM: A nylon-encased component for an electrical relay to be precision sized by milling both ends.

SOLUTION: Two PRECISE SUPER 50 POWER QUILLS mounted through plane mounts above and below working surface. Relay part is inserted between two .087" diameter carbide end cutting mills — milling completed to close tolerance as fast as operator can load and unload the fixture. Actual reduction in assembly time over previous method of operation — 55%!

SUPER 50 POWER QUILL PRECISION Features

1. Super Speeds—to 45,000 RPM at high torque under load.
2. Precision ground — satin chrome finished Steel Housing only 2½" D. and 9½" overall length.
3. Ground and honed Collet Chuck with up to ¼" capacity.
4. Available with complete line of mounts, filtration units and electric speed controls.
5. Used singly or in multiple set-ups.
6. Micro precision ball bearings with sealed-in lifetime lubrication insure chatter-free, vibration-less running, making possible tolerances of .0001".

Other Power Tools from ⅓ to 1½ H.P. and complete line of accessories described fully in our catalog, available Free on request.



Precise **PRECISE PRODUCTS CORP.**

3725 BLUE RIVER ROAD, RACINE, WISCONSIN

QUALITY AND PRECISION SINCE 1882

Use postpaid card. Circle No. 239

NEW EQUIPMENT *continued*

IMPROVED MODEL Poweramic grinder has been announced by Wesson Company, Detroit. Designed to produce honelike finishes on cutting tools with practically no skill on the part of the operator, the improved model features simplified and even more easily accessible controls. Tool grinding time is also greatly reduced. Improved finish and reduced diamond wheel cost are attributed to Wesson's Tru-Arc grinding principle. Wesson Co., 1220 Woodward Heights Blvd., Detroit 20, Mich.

Use postpaid card. Circle No. 111

QUICK PAINTING—Vinyl enamel coating can be applied safely on machinery without interrupting work schedules. Wooster Vinyl Enamel is a plastic emulsion, non-flammable during application and fire resistant when dry. Has a non-offensive, non-toxic odor not noticeable to workmen in adjoining areas.

Dries to the touch in 1 hour and is dust free in 4 hours. Spots and spills can be cleaned up with ordinary water. Wooster Finishes Corp., Wooster, Ohio.

Use postpaid card. Circle No. 112

Automatic Parts Racker

Automatic "basketing" of parts prior to, during, or after processing has been extended to load long pinions with a new feeding mechanism developed by the Gear-O-Mation Division, Michigan Tool Company. The principle is used to basket 2½-inch long pinions at a loading rate of up to 2,500 pieces per hour. Each basketing unit is custom-tailored to a specific job. This same unit can be easily modified to load pinions up to 4 inches or more in length.

Parts are fed to a dropping mechanism through an enclosed track using chain lifts and gravity flow. Rate of feed is variable through standard interlocked limit switches—with all handling, even at high speed, gentle enough to assure delivery of unmarred parts.

Michigan Tool Co., 7173 E. McNichols Rd., Detroit 12, Mich. •

Use postpaid card. Circle No. 113

Cushion Support for Grinding Discs

Now in production by Nedco Co. is a 3" diameter cushion-type rubber support for depressed center type resinoid discs and wheels.

Portable electric grinder users are enjoying new grinding ease with this disc support which absorbs vibration. This new support replaces the former metal adapter. It absorbs the shock, is easy on the operator and it is easy on the disc. It also smooths out vibration caused by mis-aligned or off-balanced discs, thus increasing disc life. The cushioning action of rubber reduces operator fatigue and prolongs the life of the grinder.

Nedco rubber support.

Nedco Co., 27 Jones Road, Waltham 54, Mass.

Use postpaid card. Circle No. 114

New Method of Buffing Printed Circuit Surfaces

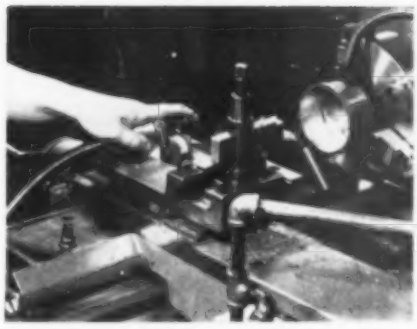
Maplewood Companies, Livingston, N. J., announce a new, fast method of buffing the surfaces of printed circuits.

In the manufacture of printed circuits, copper foil is cemented and/or laminated to an insulated sheet, such as Micarta, Formica, Synthane, or any other proprietary phenolic. Generally, either before, during or after the laminating operation, the copper surface develops imperfections which affect its use in etching operations which follow.

The new buffing method leaves the sheets dry, clean and uniform. Sheets are run continuously, doing either one side only, or both sides simultaneously at a production rate exceeding 60 square feet per minute. Moreover, no tooling is required, whether the sheet size is 12" x 12" or 36" x 36".

Maplewood Companies, Livingston, N. J. •

Use postpaid card. Circle No. 115



ANCHORED AT POINT OF USE on this lathe is a Dilley Magnetic Nozzle Holder attached to an air-hose. Powerful magnets hold nozzle in place most convenient for machine operators. Device does away with reaching for air-hoses which usually dangle overhead or lie on shop floors, creating accident hazards. Price each $12.35 in lots of less than 6. Dilley Mfg. Co., 1657 Doan Ave., Cleveland 12, Ohio.

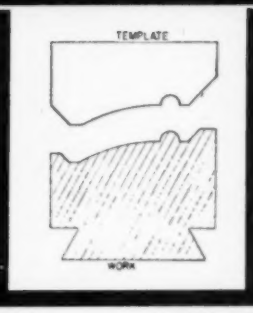
Use postpaid card. Circle No. 116

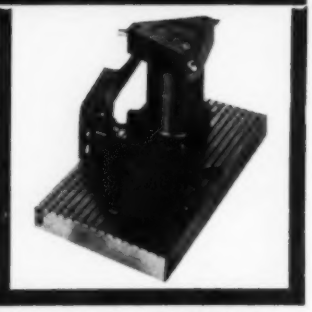
WILLEY'S
CARBIDE WORK
SUPPORT BLADES FOR
CENTERLESS GRINDERS
FROM STOCK standards & specials
Thru-Feed • In-Feed • Long-Bar
Tube & Rod • Roller In-Feed
Race • Power Race
Heavy Duty
WORK
SUPPORT
BLADES
for special application
Willey's have pioneered in the development and manufacture of carbide work support blades. Seasoned toolmakers with "know-how" build these tools for standard as well as for special applications. Many centerless grinding operations require special carbide tipped work support blades for work such as: multi-diameter—angular—form—tapered or radius grinding.
RECONDITIONING SERVICE
Willey's regrind or carbide re-tip your worn out, chipped, broken or damaged work support blades to original accuracy smooth—straight and parallel. For more than 20 years Willey's customers have used this service, often having the same blade reconditioned many times . . . a service and savings available to you too.
Write for complete illustrated catalog and price list
WILLEY'S
CARBIDE TOOL
COMPANY
1340 WEST VERNOR HIGHWAY • DETROIT 1, MICHIGAN
WOodward 1-9444

Use postpaid card. Circle No. 240

the Contour Rex RECTIFIER

NEW WAY TO PRECISION-FORM GRINDING WHEELS USING ONE TO ONE TEMPLATES and TOTALLY NEW RECTIFIER TO CORRECT TRACER FOR WEAR OF DIAMOND





Rectifier, $650.00

- Combines checking and trueing of tracer and diamond relationship.
- Tracer rectified by half-rotating motion of diamond head. Tracer ground against small grinding wheel directly below.
- Checking done with similar motion on side of indicated square preset to split .0005".
- Master square and holder for checkers included.
- One rectifier used for several dressers.

Dressing unit, $230.00

- Combines platen and diamond head. 3 diamonds and 3 tracers. Diamonds not included.
- Form dresses **hard** as well as soft wheels without removing work from grinder.
- Smallest inside radii and fillets limited only by point of diamond.
- Prices subject to change.

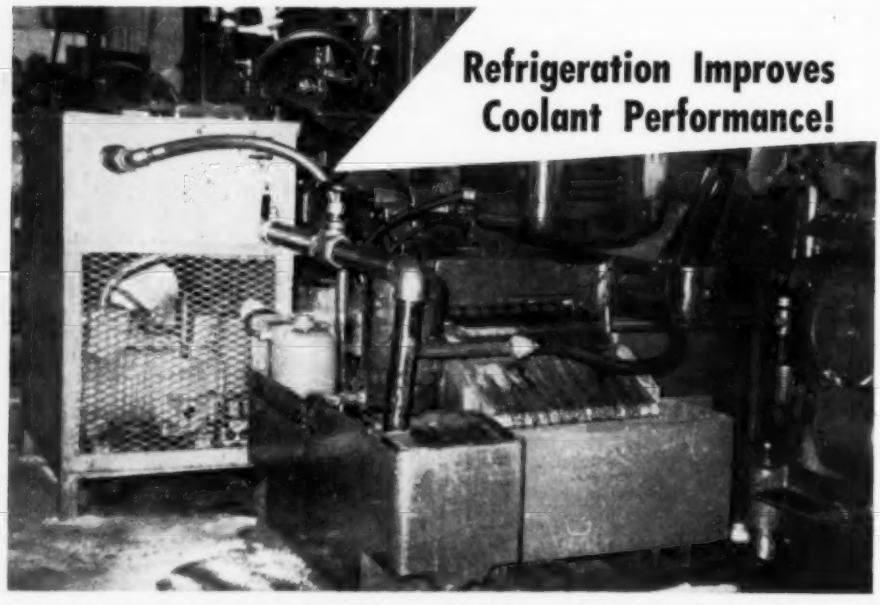
No form too large or too small—fits any grinder.

FORM-ALL MANUFACTURING CO.

Providing: "The Engineering Service for ALL Form Grinding"

364 Glenwood Avenue **East Orange 3, New Jersey**

Use postpaid card. Circle No. 241



Refrigeration Improves Coolant Performance!

Lundholm coolant chiller, left, in operation on this Landis centerless thread grinder increased wheel life and production both by 30%, lengthened time between wheel forming by 80%. Machine is used for grinding studs on a thrufeed basis.

Prior to the installation of LUNDHOLM'S coolant chilling equipment, a West Coast Manufacturer of construction, fabricating, petroleum, pipe line and shipbuilding studs up to 2¼ inches in diameter and 18 inches long, had to shut down his Landis throughfeed centerless grinding machine as the oil coolant reached prohibitively high temperatures of 170 to 180 degrees in a matter of about five hours of normal grinding. The rate of oil flow was 30 gallons per minute, and the machine sump contained 85 gallons of thead grinding oil.

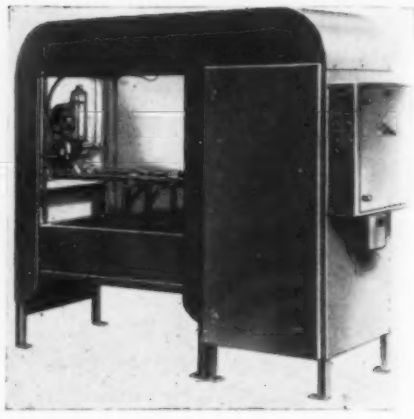
To prevent this undue overheating of the grinding oil, a LUNDHOLM COOLANT CHILLER was installed whereby, besides the improvement in the cutting action of the wheel as reflected in the elimination of a loading condition, wheel life was increased 30%, overall production also increased 30% and the period of time between wheel dressing by the crush method was increased 80%, thus saving on crush roll costs.

LUNDHOLM COOLANT CHILLERS are available in a range of capacities for fully automatic operations. SEND NOW FOR COMPLETE INFORMATION!

Mfg. by **LUNDHOLM MANUFACTURING COMPANY**

1121 CHARLES STREET **ROCKFORD, ILL.**

Use postpaid card. Circle No. 242



Reciprotron deburring machine.

Parts Deburring Machine

The Reciprotron was designed for deburring, polishing, micro-inch finishing and generating radii on machined parts. The reciprocating action operates on the principle of fixturing parts in racks, which are placed into quick-releasing rack holders.

The fixtures and parts are reciprocated by two self-lubricating driving shafts powered by a 3 hp motor with an adjustable variable speed of 90 to 380 strokes per minute.

A pan containing the proper abrasive or polishing media and solution raises to submerge the reciprocating fixtured parts in the media for a predetermined running cycle. Fixturing design prevents marring and nicking of the parts. The necessity of unloading and loading media, water and compound after each cycle is eliminated.

The Model 50 is fully automatic, measures 94"x36"x84". Size of machine may be varied to custom specifications. The machine is suited for automated production; one operator can handle three machines.

Metal Parts Sales Co., 161 Delancey St., Newark, N.J.

Use postpaid card. Circle No. 117

21,000 RPM SPINDLE is representative of precision spindles being offered by Standard Electrical Tool Co. Design is applicable to 60 cycle or high frequency motorized spindles, provides minimum overall dimensions demanded in many applications. This is a 360 cycle, 10 hp example with motor diameter of 8 inches, length 10 inches. Net weight is 130 pounds. Cutaway shows spiral channel for liquid coolant. Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.

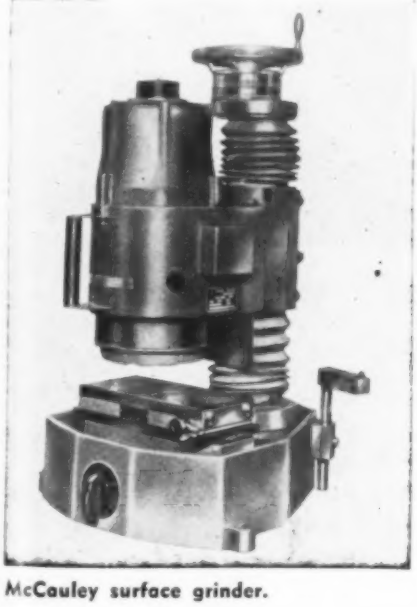
Use postpaid card. Circle No. 118

SHEFFIELD GAGE CART houses and transports the Precisionaire® air gage and related tooling, has room on its 26½" x 18½" top to accommodate both the single column gage and adjustable tooling for gaging operations. Oversize casters make the cart easy to roll by hand. The Sheffield Corp., Dayton 1, O.

Use postpaid card. Circle No. 119

Small Surface Grinder

New McCauley surface grinder is intended for precision grinding of small to medium sized parts. Bearings are supplied with continuous lubrication, moving parts are protected from dust, thrust bearings insure continuous operation without end play and the drive nut of the speed spindle can be easily adjusted to compensate for wear.



McCauley surface grinder.

The illustration shows the compact construction of the McCauley surface grinder, and these specifications detail its operational features:

Maximum Working Surface	8 in. x 6 in. (Approx.)
Motor Horsepower (3450 RPM)	3 HP
Overall Height	32 in.
Maximum Vertical Travel	9.5 in.
Wheel Diameter	7 in. (Approx.)
Weight	330 lb.
List Price	$643.00

McCauley Industrial Corp., 1840 Howell Ave., Dayton 7, O. •

Use postpaid card. Circle No. 120

Armored Flex-Set coolant hose.

Coolant Hose in Armor

Cobon Plastics Corporation's Flex-Set plastic coolant hose now comes jacketed in steel, to combat abrasion and cuts caused by hot chips or shavings. Cobon has designed the new hose unit to insure conformity of contour in any desired bending radius. It is made for coolants, sulphur base oils, chemicals, etc. and will withstand extreme pressures.

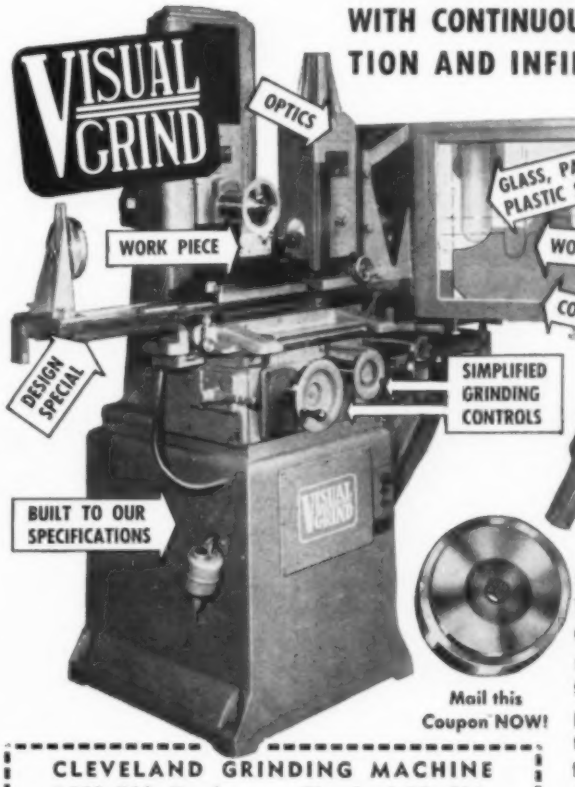
Cobon Plastics Corp., 44 Lafayette St., Newark 2, N.J. •

Use postpaid card. Circle No. 121

TOP FIRMS SHOW

PROVED SAVINGS UP TO 75%

IN SET-UP AND GRINDING TIME WITH CONTINUOUS WORK INSPECTION AND INFINITE PRECISION



SIMPLIFIED OPERATION

When working with TUNGSTEN CARBIDE, STAINLESS STEEL, STELLITE or TOOL STEELS, VISUAL GRIND permits a semi-skilled operator to grind precision pieces without continued checking with the comparator. Automatic inspection is accomplished with the built in optical comparator.

Visit our plant . . . let us show you how VISUAL GRIND will speed production — cut costs.

Mail this Coupon NOW!

CLEVELAND GRINDING MACHINE
1660 Eddy Road Cleveland 12, Ohio

Gentlemen:

☐ Please have your representative call at our plant. The most convenient time would be (week) _____

☐ Phone for appointment

☐ Please send us complete information on the new VISUAL GRIND.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

Use postpaid card. Circle No. 243

Improved Tap Sharpener

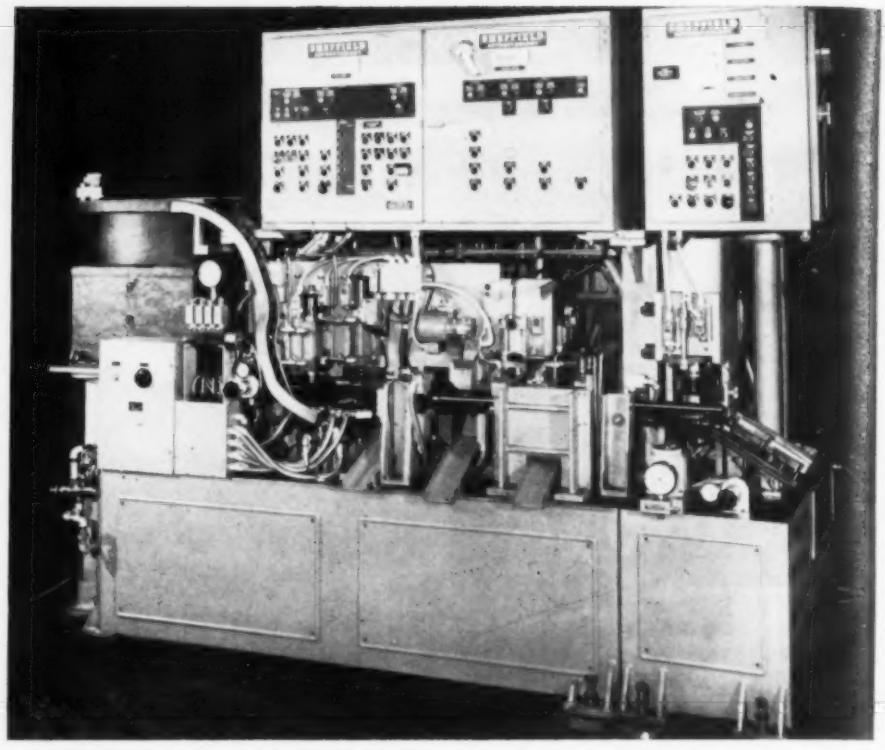
The Blake Flute Grinder has given many tap users a means of controlling rake angle on the cutting edges of their taps, and thus enabled them to obtain the correct cutting angle, according to the material to which the tap is used. The machine also corrects any minor errors in the accuracy of indexing, and as a result they get more accuracy, greater uniformity and far more life.

The Blake Company has recently announced a further advance in this machine, in that they are now manufacturing a unit equipped with air operation of the vertical slide. This is said to result in smoother finish, increased output and less operator fatigue. The operator has only to control the depth of grind.

Older Blake Flute Grinders with hand operated vertical feed can be converted by the factory, and the air operating mechanism is obtainable when wanted as an optional extra.

Edward Blake Co., Inc., 437 Cherry St., West Newton 65, Mass. •

Use postpaid card. Circle No. 122



AUTOMATICALLY GAGES, ASSEMBLES BEARINGS—New Sheffield automatic taper roller bearing assembly machine automatically gages the diameter and thickness of the inner races, selects the proper number of rolls from one of six preselected size hoppers and automatically assembles race, rollers and cage into a bearing of predetermined tolerance. Bearing is then checked for torque, standout and noise level and segregrated as acceptable or reject.

Use postpaid card. Circle No. 123

NEW MULTI-BARREL FINISHER
handles many small loads

Furnished with movable chutes or tote boxes.

Various combinations of barrels are available.

MODEL RT-6, the multi-purpose tumble-finishing machine, solves the problem of increasing load capacity without adding separate machines. It handles large or small loads, of one part or a wide variety. It can be furnished with regular-size or smaller barrels . . . for 2, 3 or 4 compartment operation. The RT-6, as illustrated, has four 5-gallon barrels, with Variable Speed Drive from 12 to 36 RPM. Other features include a ½-HP motor, 220/440 volts 3-phase, a watertight switch and magnetic starter.

FULL DETAILS are given in new Rampe Catalog. Write for your copy today.

RAMPE MANUFACTURING CO.
14917 WOODWORTH AVE., CLEVELAND 10, OHIO

BARREL FINISHERS • SCREEN SEPARATORS • COMPOUNDS • MEDIA/SLUGS

Use postpaid card. Circle No. 244

PRECISION DRESSER

Desmond precision ball bearing dressers can replace diamonds on surface, centerless, and machine grinders in many instances—at substantial savings. Where diamonds are required for extreme final truing, Desmond precision dressers still can be used for semi-finish dressing. Five models available, each with easily replaceable hardened tool steel cutters and dust-protected ball bearings. Ask your Desmond distributor or write direct for catalog and full information.

The only complete line of grinding wheel dressers and cutters

Desmond

THE DESMOND-STEPHAN MFG. CO., URBANA, OHIO

Use postpaid card. Circle No. 245

Single Spindle Polisher Has Dust Collector

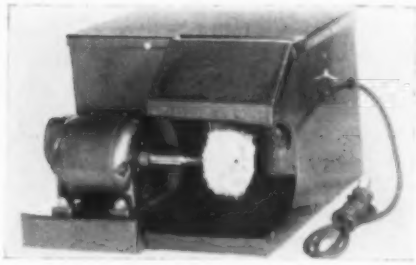
Producers of small metal parts which require polishing, instrument manufacturers, dental and optical laboratories and others, are now offered an inexpensive polishing machine with the advantages of a dust-collector unit in the new Vu-Al One-Spindle Polisher. While the larger, two-spindle polishers may be required for heavy production work, especially where a variety of buffs and wheels must be used, the Vu-Al one-spindle polisher is an efficient machine where few changes need be made in buffs and wheels.

Compact and made to fit on a bench or in any other small working space, the Vu-Al Polisher measures 9″ x 12″ x 14″. Operating on 120 AC, it has a sturdy, 3450 RPM polishing motor and a separate dust-collector motor. Suction takes in all polishing dust, keeping the work area dust-free; where precious metals are being polished it collects and saves the dust to be reclaimed. The dust collector's 6″ x 8″ spun glass filter is easily cleaned, and easily changed; replacement filters are inexpensive. A screen keeps tools and parts, dropped in polishing, from being drawn into the filter.

The Vu-Al Polisher has an all-metal case with hammertone-gray lacquer finish. A strong light under the hood gives clear vision of work being done.

Vu-Al Products, Dept. GF, 424 S. Broadway, Los Angeles 13, Calif. •

Use postpaid card. Circle No. 124



VU-A1 polisher with integral dust collector.

Imported Grinding Head

Air Transport Equipment, Inc., is introducing to the American market the British-made Wright motorized grinding head, an attachment capable of converting planers, boring and milling machines, and heavy lathes to heavy duty grinding. The Wright, a self-contained motorized vertical spindle grinding head, provides compensation for wheel wear, and fine adjustment of depth of cut is obtained through vertical adjustment of the motor-rotor by means of a spring-loaded handwheel.

The unit is motorized for AC 3 phase, 60 cy., 220-440 v., developing 1 h.p. at 3,000 r.p.m., and is fitted with a cup type grinding wheel 8″ in diameter by 2″ deep. Higher powered units up to 4 h.p. and other wheels are available.

Air Transport Equipment, Inc., Albany Ave., Amityville, N.Y. •

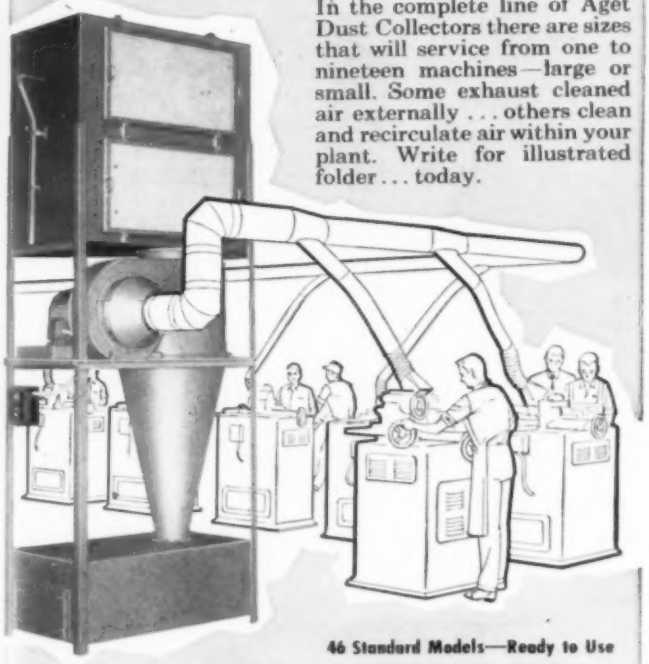
Use postpaid card. Circle No. 125

Wright vertical grinding head.

just ONE DUSTKOP STOPS DUST

heavy duty unit services up to 19 MACHINES

In the complete line of Aget Dust Collectors there are sizes that will service from one to nineteen machines—large or small. Some exhaust cleaned air externally . . . others clean and recirculate air within your plant. Write for illustrated folder . . . today.



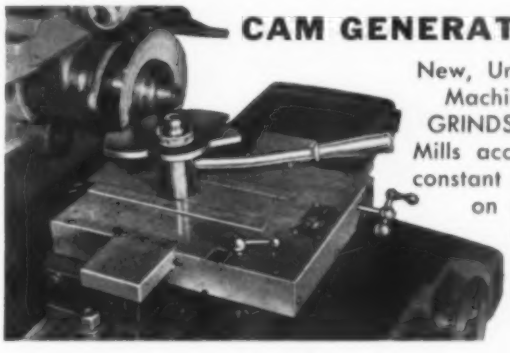
46 Standard Models—Ready to Use

AGET manufacturing company
1380 Church Street • Adrian, Michigan

Use postpaid card. Circle No. 246

ACCURATE Screw Machine Cams—FAST with

GEN-A-CAM Precision CAM GENERATOR



New, Unique Machine GRINDS or Mills accurate constant rises on plate cams

Generates precision ground constant uniform cams in your own shop with a minimum of equipment and investment. Used for machining cams for Brown & Sharpe, BSA, Detroit Screwmatic or any Automatic using plate cams.

GEN-A-CAM PRECISION CAM GENERATOR was designed and tested by men who know the requirements for manufacturing plate cams for automatic screw machines. Using a sine bar system an infinite selection of rate of rise from .000 (dwell) to .100 in. rise per hundredth of cam rotation is available. (Graduations for Swiss Automatics in inches per degrees optional. .000 to .030 inches per degree.)

GEN-A-CAM permits increased speed, feeds, tool life and the altering of hardened cams in minutes during set up. Eliminates downtime and permits variation from original layout to shorten cycle time.

GEN-A-CAM generates lobes to 70 hundredths with one setting, lobes greater than 70 hundredths with two settings. Shorten lead time—avoid costly downtime with GEN-A-CAM GENERATOR.

GUARANTEED—If not completely satisfactory, return prepaid within 10 days.

WRITE for full details and price. Patent applied for.

STEUBY MANUFACTURING CO.
Machine Products Division St. Louis 13, Missouri

Use postpaid card. Circle No. 247

Storage and Demand-Feed Unit

Storage unit for no-roll parts handling in automated processing lines has been developed by the Gear-O-Mation Division, Michigan Tool Company. Designated a circular storage unit, equipment is designed to offer a true demand-feeding system from a controlled mobile-storage medium for irregularly shaped and interlocking parts that do not normally roll. Although primarily designed for parts such as spur gears, the unit can also be used for normally rolling parts. It works on a "first-in, first-out" principle with no dead storage. Capacity is 600 parts using two internal levels or tiers.

Each unit is custom-tailored to a specific job and assembled from standard components.

Michigan Tool Co., 17140 E. Ten Mile Road, East Detroit, Mich. •

Use postpaid card. Circle No. 126

Rubber Wheel for Cleaning, Buffing, Surface Conditioning

A buffing wheel consisting of 17 rubber pads of special design has been introduced by James Back & Associates, Dayton, Ohio.

The Kwik Kleen Buffer can be used without shield on rubber, plastics and other soft materials. It has proven ideal for the removal of flash and trim from production molded rubber and plastic parts and for the cleaning of flash and smudge from recapped tires and white sidewalls. Exceedingly long wheel life is experienced without surface burning, scorching or scratching.

The Kwik Kleen Buffer wheel is 4½ inches in diameter and 1½ inches wide. It is available with or without special threaded adapter nut, for operating speeds from 1750 to 3450 rpm.

James Back & Associates, P.O. Box 532, Riverdale Station, Dayton 5, Ohio.

Use postpaid card. Circle No. 127

Attachment Generates Precise Cams

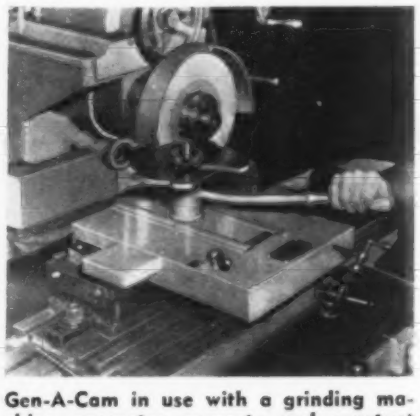
The Gen-A-Cam attachment, just introduced, makes possible the generation of precision cams for automatic machines in the shop where they will be used, as a saving in time and money over having cams for an operation made outside the shop.

The new attachment operates on the principle of converting rotational (circular) motion to curvilinear motion by means of a precision sine bar. The sine bar eliminates the need for change gears and offers an infinite selection of rates of rise from dwell to .100-inch per hundredth, or for Swiss cams from zero rise per degree to .030-inch per degree.

With the Gen-A-Cam, the shop can have precision ground cams for rush jobs that put them in production in a matter of hours instead of days or weeks. During the setup period on the automatic, either hardened or soft cams can be altered to conform to any unforeseen difficulty. All layouts for automatics can be figured closer with this attachment available to make alterations in the cams, according to the manufacturer.

Steuby Mfg. Co., 4595 Easton, St. Louis 13, Mo.

Use postpaid card. Circle No. 128



Gen-A-Cam in use with a grinding machine generates accurate and constant rises on plate cams.

BETTER CUT WITH BEAVER CUT CARBIDE

Cushion Ground and Micro-Lapped Rotary Files, Grinding Burrs, and Center Lapping Tools outlast regular ground carbide tools by 30% yet cost no more.

You may make a greater saving by sending us your dull tools for sharpening by our manufacturing method.

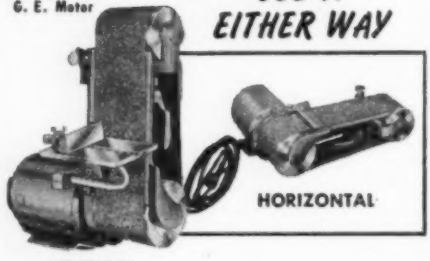
Beaver Cut Rotary File Company
401 E. Slauson Ave.
Los Angeles 11, Calif.

Use postpaid card. Circle No. 248

WALLS TU-WAY BELT SANDER

USE IT EITHER WAY

Full 1/3 h.p. G. E. Motor



At last, a top quality industrial sander that provides all the most wanted features — yet sells for so little.

complete with cord, plug, switch ready to use **$89.95**

Illustrated Literature on Request
A few desirable distributor territories still available.

WALLS SALES CORPORATION
333 Nassau Avenue Brooklyn 22, N. Y.

SALESMEN

DIAMOND TOOLS & WHEELS

One of America's leading manufacturers of nationally advertised diamond tools and wheels has several excellent territories available.

An exceptional opportunity, limited to top calibre, dynamic men of proved sales ability currently handling Allied lines.

Compensation by either salary or commission.

Write or wire details immediately to: Box No. 12

Grinding & Finishing, 222 E. Willow, Wheaton, Ill.

Use postpaid card. Circle No. 250

Grinding and Finishing

News of Industry

Society for Abrasives Announces Charter Members— Detroit Chapter Meets

The newly formed American Society for Abrasives, announced in the April issue of GRINDING AND FINISHING, has announced a list of abrasives manufacturing firms which have become charter members in the organization. They are as follows:

Macklin Company
Jackson, Michigan
Waltham Grinding Wheel Co.
Waltham, Massachusetts
A. P. DeSanno & Son, Inc.
Phoenixville, Pennsylvania
General Grinding Wheel Corporation
Philadelphia, Pennsylvania
Acme Abrasive Company
Center Line, Michigan
Cortland Grinding Wheels Corp.
Chester, Massachusetts
Koebel Diamond Tool Company
Detroit, Michigan
The Fuller Merriam Company
West Haven, Connecticut
Maurice S. Dessau Co., Inc.
New York, New York
Sterling Grinding Wheel Co.
Tiffin, Ohio
Norton Company
Worcester, Massachusetts
Master Chemical Corporation
Toledo, Ohio
Precision Grinding Wheel Co., Inc.
Philadelphia, Pennsylvania
Bay State Abrasive Products Co.
Westboro, Massachusetts
Simonds Abrasive Company
Philadelphia, Pennyslvania
National Grinding Wheel Co., Inc.
North Tonawanda, New York
Clover Manufacturing Co.
Norwalk, Connecticut

In an announcement by the Detroit chapter of the society, it was stated that the chapter has submitted a charter and elected a board of governors. Members present were: L. K. Pruett, acting president—Ford Motor Co; M. F. Schlie, acting vice president—Detroit Transmission G.M.C.; E. R. Sorenson, acting secretary—Detroit Transmission G.M.C.; F. T. Hall, acting treasurer—Process & Development Div. G.M.C.; J. H. Gills, acting membership chairman—The Carborundum Co.; J. W. Joynt, Ford Motor Co.; C. E. Edwards, Ford Motor Co.; D. R. Dauphin, Chrysler Corporation.

The first formal meeting of the Detroit Chapter has been tentatively set for the month of October. Application for membership may be obtained from any of the members listed above.

General headquarters of the Society is 222 Berks County Trust Building, Reading, Pa. Jan L. Deelman is secretary of the Society. •

Norton Plans New Grinding Wheel Plant in Worcester

A new $6.5 million plant for the manufacture of grinding wheels will be built by Norton Company. When completed in mid-1959, the five acre plant will contain the most modern facilities for making organic bonded grinding wheels. This plant, to be known as Plant 8, has been designed for straight line production of wheels up to 30 inches in diameter.

The plant will be located parallel to Plant 7, built in 1947-8 for the straight line production of vitrified grinding wheels. The new plant, somewhat larger than Plant 7, will include many similar production features. In both plants, materials will be received at the north end. Wheels in process will flow southward via various conveyor systems which eliminate manual handling between steps of manufacturing. Finished stock will be stored and shipped from the south end of both plants.

Part of the manufacturing area will also be air conditioned because of the need for closely controlled temperature and humidity conditions to insure high quality in certain steps of the wheel making process. •

Expansion at MPB

Construction has begun on a $300,000 addition to the plant of **Miniature Precision Bearings, Inc.,** Keene, N.H. Expansion has been prompted by an increase in business of approximately 25% during the year. Expansion program will enable the company to offer 30-day delivery lead time on bearing orders. Miniature Precision Bearings, Inc. produces more than 500 types and sizes of miniature ball bearings of extremely close tolerances for a wide range of applications in aviation instruments, guided missile components, medical and dental instruments and electronic components.

The MPB plant is the first of its kind to be designed strictly for the production of precision ball bearings in the miniature range of up to ⅛ths of an inch outside diameter. Like the present plant, the new addition will be completely air-conditioned. Temperature and humidity control will insure the dust free atmosphere so essential to MPB's operations. The grinding, honing and polishing department will be doubled by the expansion. •

OIL MIST PRECIPITATORS in the grinding area of Miniature Precision Bearings, Inc., electronically remove the excess oil mist that lubricates the high frequency wheelheads of these internal grinders.

Danielson Completes Sixty Years In Grinding Wheel Industry

Irving Danielson, vice president of Chicago Wheel & Manufacturing Co., has just been awarded a plaque indicating sixty years of continuous service in the grinding wheel industry. This puts Danielson in the unique position of being one of two men in the industry having this service record.

Interviewed by GRINDING AND FINISHING, Danielson said, "I've seen many changes in my sixty years. To me it seems that about every seven to eight years brings about a new cycle in the grinding wheel industry. Things that were the best practical method of producing something are completely obsoleted and new methods are found.

"Take a Scotch stone used to produce rolled oats. Years ago these were imported from Scotland. That, I believe is why they called rolled oats—Scotch Type Rolled Oats. The sand stones imported had a particular characteristic which lent themselves to the production of rolled oats.

"To the best of my knowledge and belief we were the first people to produce the synthetic hulling stone for rolled oats. We used an aluminum oxide abrasive and bonded it in such a fashion that it outlasted the natural stone imported from Scotland by many months.

"And so it goes, so it goes, with the cycles. The wheels are so expensive to make, being some sixty inches in diameter, that when wear took place, they patched the wheels with bonded abrasive.

Irving Danielson, Chicago Wheel v.p., recently commended for 60 years' service in the grinding wheel industry.

"At one time we produced many hundreds of Mongol Razor Hones. I have seen the cycle change until today practically no Mongol Hones are produced.

"I well recall that we were one of the first people to make a combination stone having coarse on one side and fine on the other for sharpening tools, et cetera. These were made with natural abrasives. We made size stones at the same time with a rod inserted using a silicate bond. The cycle changed and these were replaced by synthetic stones vastly superior to the natural."

Danielson has sponsored the development of many processes and products marketed by Chicago Wheel & Manufacturing Company. Many of their dental abrasives were first developed by Danielson.

Carborundum Modernization

The Carborundum Company has launched a $3,200,000 modernization and expansion program at its three silicon carbide furnace plants in the U.S. and Canada. Participating in the project will be the Niagara Falls, New York plant and Vancouver, Washington plant, both operated by the Electro Minerals Division; and the Shawinigan Falls, Quebec plant of Canadian Carborundum Company, Ltd.

The preponderance of the expansion

Hold mill-like tolerances

CUT ANY METAL... DAY IN, DAY OUT!

STONE

MODEL M-100 Chop-Stroke Cut-Off Machine gives fast, accurate, fully automatic cutting

Cuts any stock . . . in a wide range of shapes, lengths and diameters . . . any material, from aluminum to hardened tool steel. The M-100 will cut it swiftly, cleanly, accurately. Set-ups or resets are easily made. The M-100 cuts at a rate of 2 to 4 seconds per sq. in. cross sectional area . . . up to 5 times faster than comparable power cutting. Exclusive Stone geared-in-head motor delivers maximum power to the cutting edge. Greater speed of cutting produces no change of characteristics nor hardening of material cut.

The M-100 is powered by a 10 H.P. continuous duty, TEFC ball bearing induction type motor. Cuts ferrous metals with an abrasive wheel . . . non-ferrous metals with a saw blade. It comes with fully automatic stock feed and automatic abrasive wheel wear compensator for faster, more accurate cutting without shut-down for adjustment.

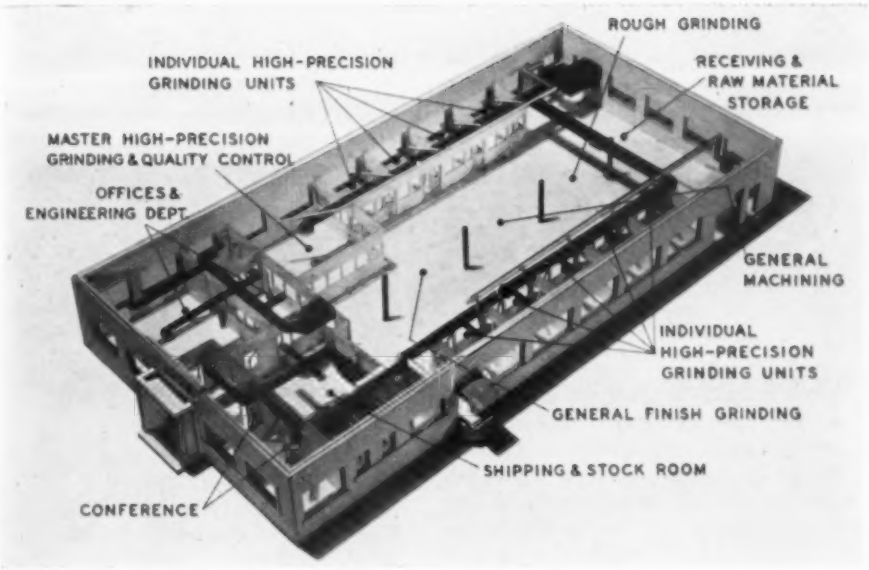
The M-100 may be had for manual or semi-automatic operation. For greater power needs, a 15 H.P. motor is available.

WRITE TODAY for complete information on the Model M-100 and other cut-off machines by Stone. 15 Models available in 3½ to 20 H.P. manual, semi or fully automatic operation. Sales and service in principal cities.

". . . represented in every major industry throughout the world."

STONE MACHINERY COMPANY, INC.
121 Fayette Street, Manlius, New York

Use postpaid card. Circle No. 251



SOMMA TOOL COMPANY, Inc., Waterbury, Conn., will soon move to a new building engineered to provide the most efficient means of turning out the hundreds of small orders for special high precision circular form tools.

Major feature of the plant is the individual grinding room for each of ten grinding machines doing high precision work. Each is a complete grinding shop in itself for high precision work, including all the special gaging and checking equipment required, including an optical comparator, for in-process as well as finished inspection.

will be placed in the Shawinigan Falls and Vancouver plants. This is because of more favorable power rates at these locations. The limited expansion at Niagara Falls was based on the expectancy that future power at reasonable rates would be made available at Niagara Falls, N.Y.

The project will increase the combined capacity of the three plants approximately 25%. Already the world's largest producer of silicon carbide, the increased capacity was required to meet the rising demand for this electric furnace product. Requirements for silicon carbide are growing, not only in the abrasive and refractory fields which The Carborundum Company has long served, but also in the chemical, metallurgical and electrical applications. •

Gardner-Denver Acquisitions

Purchase of the plant of the **Camfield Manufacturing Company,** Grand Haven, Michigan, by the Gardner-Denver Company has been announced. Involved in the transfer is a building containing 68,000 square feet of manufacturing space. Included are 47,200 square feet of manufacturing space plus office facilities, a locker room and laboratory and an adjacent storage building. Indicated purchase price was near $160,000.

Acquisition of a new factory in Rio de Janeiro, Brazil, to expand Gardner-Denver Company's manufacturing facilities has also been announced.

The plant, containing approximately 22,000 square feet of manufacturing and office space, is located in a new outlying industrial district of the capital city.

The first consignment of machine tools and other equipment has been shipped from the U.S. and will soon be installed in the new plant of the company's subsidiary, Gardner-Denver of Brazil, S. A. •

100,000TH EX-CELL-O SPINDLE—Manufacture of its 100,000th precision spindle was recently achieved by Ex-Cell-O Corporation, Detroit. To mark this milestone in the production of spindle assemblies for accurate machining operations the unit was gold plated and will be retained for permanent display. The 100,000th Ex-Cell-O Spindle is an in-built motor unit of the type commonly used on surface grinders, and developing one horsepower at a synchronous speed of 3600 rpm. James K. Fulks, executive v.p., and D. H. McIver, v.p., are shown with the milestone unit.

PRESSURELOK® -224
RESINOID DIAMOND WHEELS

The *Best* Diamond wheel ever developed

- U.S. DIAMOND'S PROVEN REVOLUTIONARY "PRESSURELOK"® Process increases Diamond holding efficiency by 300%.
- Positively no danger of heating or cracking carbide with the most rapid stock removal.
- Use dry or with coolants.
- They are consistently super-finishing, out-producing, under-costing any other Diamond wheel ever produced . . . and they are always readily available.
- If you have used them, you know they are the best! . . . If you haven't, let us show you!

U S

UNITED STATES DIAMOND WHEEL CO.
835 ILLINOIS AVENUE
AURORA ILLINOIS

Use postpaid card. Circle No. 252

Company Briefs

The Motch & Merryweather Machinery Company, Cleveland, announces the appointment of **Tornquist Machinery Company,** 3838 Santa Fe Avenue, Los Angeles 58, California, as their representatives in the Southern California area.

Executive offices of **Robertshaw-Fulton Controls Company,** now at Greensburg, Pa., will be relocated in early Fall in Richmond, Va.

The establishment of **Westinghouse Electric Corporation's** Reactor Evaluation Center was announced on July 8 as press representatives toured the new facility for the first time. Site of the center is on an 850-acre tract, 29 miles southeast of Pittsburgh. The center will be used to check out the reactor calculations and the value of various types of control rods in prototype cores for power reactors, and represents further progress in peacetime application of atomic energy.

Consolidated Foundries & Manufacturing Co., Chicago, has acquired the investment casting business of the **N. A. Woodworth Company,** Detroit. N. A. Woodworth will continue its manufacturing and machining operations. Consolidated operates 14 plants in foundries and allied lines.

Construction began June 15 on a one-story tile and steel building to provide additional facilities for special refractories at **Electro Refractories and Abrasives Corp.** The 8,000 square feet provided by the 200 by 40 foot addition will be used for output of custom industrial refractories.

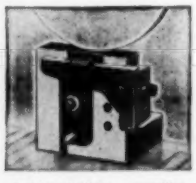
United States Steel's South Chicago plant has received the Award of Honor from the National Safety Council for its outstanding safety record achieved earlier this year. The award was the result of the employees of the South Works plant working a total of 5,304,700 man hours during the period from January 19, 1957 to March 27, 1957 (69 days) without a disabling injury.

Plans for increasing the number of **Pratt & Whitney Company** branch sales offices by more than 50% have been announced. Before the end of the year, new offices will have been established in 9 cities in the United States, in addition to the present 16, and two major offices in Rochester, N.Y. and in Hartford, Conn. will move to new expanded locations.

Engineers at Solar Aircraft Company, San Diego, study a mockup of the company's newest small gas turbine engine. It is being designed and produced by Solar under a joint Navy Bureau of Aeronautics and U.S. Army contract and will be used to power a one-man helicopter. The engine, known as the Solar Mercury with a military designation of YT-62, is the smallest gas turbine aircraft engine ever built.

LASSY MASTER V-BLOCK ANGLE PLATES

For Inspection, Grinding, Machining & Layout. Hardened, ground & lapped finish. Accurate to .0001 Assures precise work accuracy, requires less skill.



Adjustable parallel holds the smallest work for position and clamping with ease and accuracy.

Side Gage automatically squares work precisely and without removing angle plate from chuck. Repetitive accuracy maintained.

WRITE FOR FREE DESCRIPTIVE LITERATURE

LASSY TOOL COMPANY, Plainville, Conn.

Use postpaid card. Circle No. 253

New Reprints

How to Reduce Snagging Costs by Proper Wheel Testing, by A. S. Wyborski

Incentives—Good or Bad?—reprinted from MACHINE and TOOL BLUE BOOK, a Hitchcock Publication

—both free while the supply lasts

222 E. Willow Ave.—Wheaton, Illinois

GRINDING CIRCULAR FORM TOOLS

They'll cost less made from SOMMA blanks — delivery from stock.

You not only save the expense of making up blanks in your tool room, you save time as well, since same day shipment can be made on #00, #0, and #2 B&S blanks as well as Davenport form, sizing and roll blanks. Blanks also available for other machines or made of **T-5** High Cobalt Steel.

Write for name of Somma representative near you, and price list of blanks and complete line of Standard Circular Form Tools.

Somma TOOL CO., INC. 117 SCOTT ROAD, WATERBURY, CONN.

West Coast Warehouse: 576 N. Prairie, Hawthorne, Cal.

Use postpaid card. Circle No. 254

Personnel Briefs

Borg-Warner Corp. has announced the promotion of **Keith N. Stought** to Plant Manager of the Industrial Crane & Hoist, Ingersoll Products Division.

William R. Wetzel recently joined the sales department at the Macklin Co., Jackson, Michigan after successfully completing the company's in-plant training program.

K. N. Stought, Plant Mgr., Borg-Warner Corp.

W. R. Wetzel, Macklin Co.

John C. Ewer has completed a seven year assignment as managing director of Norton Grinding Wheel Company, Ltd., of Welwyn Garden City, England and has returned to Norton's main office at Worcester, Mass. Ewer has been appointed Assistant Sales Manager, Abrasives.

Paul A. Bisnette has been appointed a Field Engineer assigned to the Los Angeles office of Norton Company.

J. C. Ewer, Assistant Sales Mgr., Norton Co.

P. A. Bisnette, field engineer, Norton Co.

Lee Mulrooney is the new Western Michigan representative of Chicago Wheel & Mfg. Co., with headquarters at 1900 Monroe Ave., Grand Rapids.

W. L. Huber, manager of Diamond Tool Research Co., Inc., New York, was elected president of the Industrial Diamond Association of America, Inc., at the IDA's recent meeting in Detroit.

Lee Mulrooney, western Michigan rep., Chicago Wheel & Mfg.

W.L. Huber, president, Industrial Diamond Association.

William J. McKee, now general manager of sales, will become assistant vice president-sales, National Tube Division of U.S. Steel. **Robert E. Williams,** director of distribution and availability, U.S. Steel Corporation, is appointed general manager of sales, succeeding McKee.

Wayne Gustafson has been appointed Sales Supervisor, Armour and Company, Coated Abrasives Division, for sections of the states of Illinois, Wisconsin and Iowa.

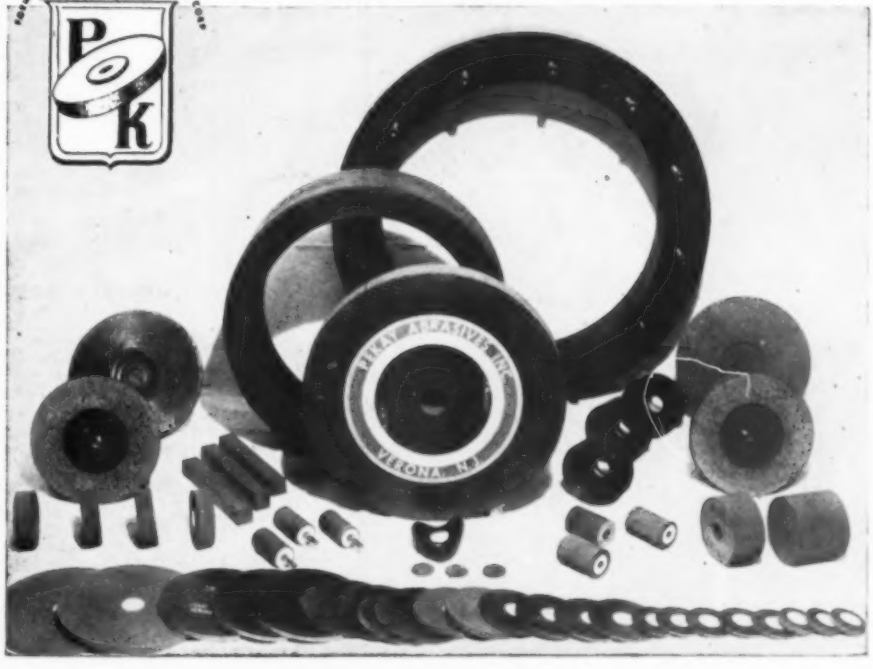
Edwin R. Reed has been appointed California District Sales and Service Engineer for Norton Company's Grinding Machine Division.

Carbide Form Grinding, Inc.

Specialists in Die Sections and Cutting Tools.

1406-45th St. Brooklyn 19, N.Y.

A complete line of custom Abrasives



Are you grinding with 1957 model grinding wheels or just letting the old "metal burner" do?

Let us show you what real wheel development is. For example, a flexible rubber bonded wheel that operates safely at 16,000 f.p.m.

Let Pekay show you the way.

Send For Complete Information.

PEKAY ABRASIVES, INC.

271 GROVE AVENUE VERONA, NEW JERSEY

CENTER 9-4600-1

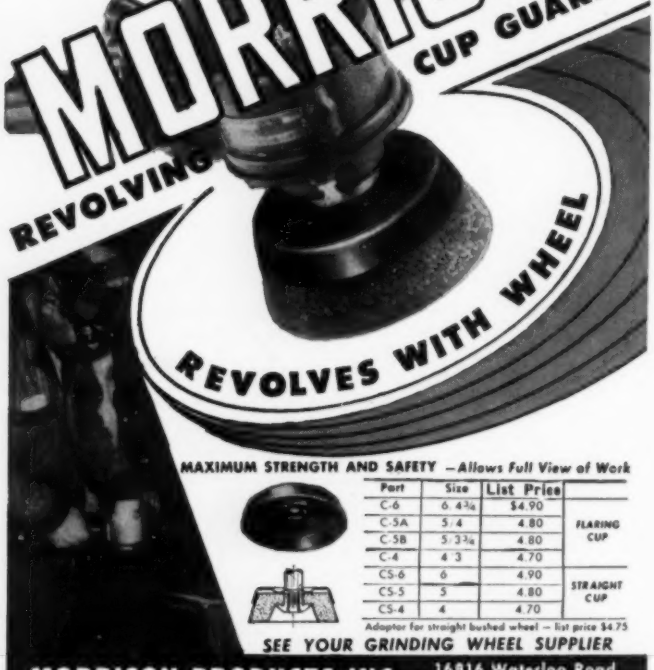
Use postpaid card. Circle No. 255

LATEST DEVELOPMENT IN WHEEL GUARDS...FOR PORTABLE GRINDERS WHEN USING FLARING CUP AND STRAIGHT CUP WHEELS...

MORRISON CUP GUARDS

REVOLVING

REVOLVES WITH WHEEL



MAXIMUM STRENGTH AND SAFETY —Allows Full View of Work

Part	Size	List Price	
C-6	6 4¾	$4.90	FLARING CUP
C-5A	5 4	4.80	
C-5B	5 3¾	4.80	
C-4	4 3	4.70	
CS-6	6	4.90	STRAIGHT CUP
CS-5	5	4.80	
CS-4	4	4.70	

Adaptor for straight bushed wheel — list price $4.75

SEE YOUR GRINDING WHEEL SUPPLIER

MORRISON PRODUCTS INC. • 16816 Waterloo Road Cleveland 10, Ohio

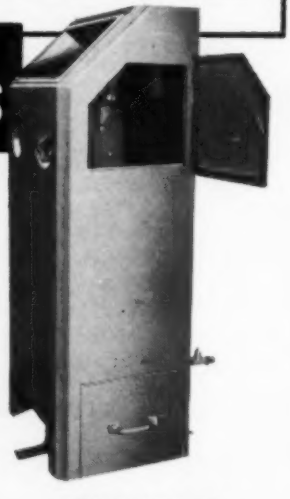
Use postpaid card. Circle No. 256

Save with Sandblasting!

Do all these operations better, faster, at lower cost with

- Cleaning metal surfaces, molds, dies, tools
- Removing burrs, scale, carbon, rust, paint
- Preparing surfaces for plating and finishing
- Producing satin and matte finishes
- Stenciling, lettering, trademarks

Cabinet Type LEIMAN SANDBLASTS



Whether you work on metal, glass, plastics, compositions... whether on production runs or single pieces, large or small—you'll find countless uses for versatile Leiman Sandblasts. Easily operated by unskilled help. Require little floor space. Use all types of abrasives. Well-designed, rugged, priced right, last for years.

Send for informative bulletin "Sandblasting", plus catalog showing complete line.

LEIMAN BROS., Inc. 109 Christie St., Newark 5, N. J.

Use postpaid card. Circle No. 257

GRINDING and FINISHING

DISTRICT MANAGERS

EASTERN DIVISION

Dan E. Reardon, V.P.
Box No. 1, South Glastonbury, Conn.
Telephone: MEdford 3-7083
or
c/o Hitchcock Publishing Co.
55 West 42nd Street
New York 36, N.Y.
Telephone: LAckawanna 4-4528

NEW ENGLAND—CONN., MASS., R.I., ME., N.H. & VT.

John Pickering, Jr.
Box 29, Andover, Massachusetts
Telephone: MUrdock 8-0913

EASTERN PENNA., EASTERN N.Y. STATE, N.J., MD., DELA., D. of C.

H. George Burnley
c/o Hitchcock Publishing Co.
55 West 42nd Street
New York 36, N.Y.
Telephone: LAckawanna 4-4528
Home Address: Saddle River, N.J.
Telephone: DAvis 7-1546

CENTRAL DIVISION

SOUTHWESTERN OHIO, INDIANA, KENTUCKY

Henry J. Smith, V.P.
c/o Hitchcock Publishing Co.
222 East Willow Avenue
Wheaton, Illinois
Telephone: WHeaton 8-3400

MICHIGAN, NORTHERN IND., NORTHWESTERN OHIO.

William E. Jacobs
c/o Hitchcock Publishing Co.
18055 James Couzens Highway
Detroit 35, Michigan
Telephone: Diamond 1-9525

ILLINOIS, IOWA, MO., WISC., MINN., UPPER PENINSULA of MICH., and S. DAKOTA

Robert G. Bolinder
c/o Hitchcock Publishing Co.
222 East Willow Avenue
Wheaton, Illinois
Telephone: WHeaton 8-3400

WESTERN NEW YORK STATE, WESTERN PENNA., OHIO

Ralph E. Helfrick
1507 Edgefield Road
Cleveland 24, Ohio
Telephone: HIllcrest 2-0189

WESTERN DIVISION

CALIFORNIA, ARIZONA

Keith H. Evans
3723 Wilshire Boulevard
Los Angeles 5, California
Telephone: DUnkirk 8-2981

and: 593 Market St. (Room 816)
San Francisco 5, Calif.
Telephone: YUkon 2-4280

OREGON, WASHINGTON

Lloyd Thorpe
6133 Arcade Building
Seattle 1, Washington
Telephone: MUtual 7525

HITCHCOCK PUBLISHING CO.
Telephone WHeaton 8-3400
Wheaton, Illinois

Index to Advertisers and Products

A

Abrasive Machine Tool Co. 48a
(Grinding Machines)
Aget Mfg. Co. 71
(Dust Collectors)
F. E. Anderson Oil Co. 8
(Coolants and Lubricants)

B

Barnes Drill Co. 64b
(Honing Tools)
Bay State Abrasive Products 48b
(Grinding Wheels)
Bearings, Inc. 56
(Spindle Repair Service)
Beaver Rotary File Co. 72
(Rotary Cutting Tools)
Blanchard Machine Co. 14
(Grinding Wheels)
Bryant Chucking Grinder Co. 4, 5
(Grinders)

C

Chicago Wheel & Mfg. Co. ..... 4th Cover
(Grinding Wheels)
Cincinnati Grinders Inc. 2, 3
(Grinders)
Cincinnati Milling Machine Co. 42
(Grinding Wheels)
Cleveland Grinding Machine Co. 69
(Grinding Machines)
Cortland Grinding Wheel Corp. 41
(Grinding Wheels & Chucks)
Crystal Lake Grinders Co. 79
(Grinding Machines)

D

Desmond Stephan Mfg. Co. 70
(Abrasive Belts)
DoAll Co. 22
(Grinding Coolants)

E

ElectroMatic Products Co. 58
(Electro Magnetic Chuck Control)
Elox Corp. 44
(Electrical Discharge Machines)
Engis Equipment Co. 63
(Diamond Compounds)
Ex-Cell-O Corp. 16d
(Precision Grinding Spindles)
Exolon Co. 17
(Wet Blasting Abrasives)

F

Form-All Mfg. Co. 68
(Contour Rectifier)

H

Harig Mfg. Co. 48
(Surface Grinders)
Heald Machine Co. ..... 2nd Cover
(Grinding Machines)

J

J & S Tool Co. 12
(Wheel Dressers)
Johnson & Son, S. C. 64a
(Coolants)

K

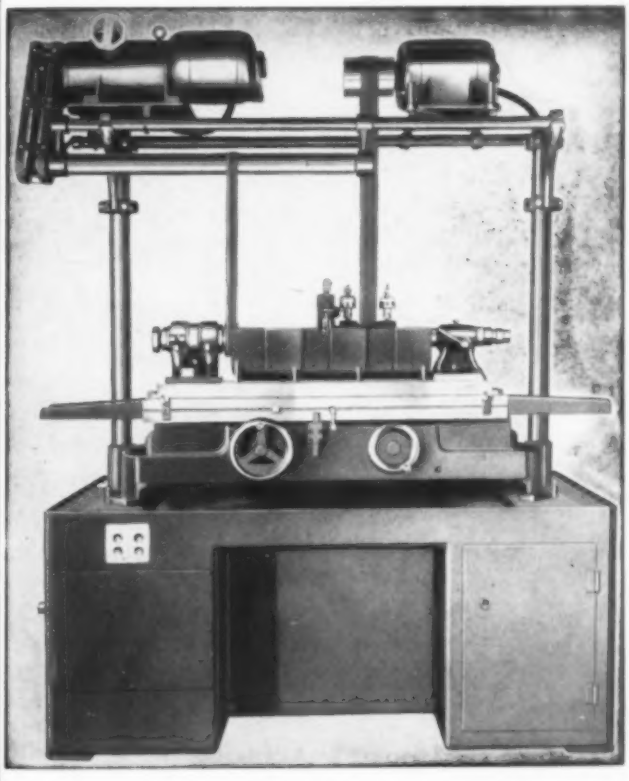
Kirk & Blum Mfg. Co. 52
(Dust Collectors)
Koebel Diamond Tool Co. 13
(Diamond Tools)
H. W. Kramer Co. 65
(Tumblers & Buffers)
Kuzmick, Paul L. Co. 77
(Pekay Abrasives) (Abrasive Wheels)

HOW CAN YOU LOSE WHEN YOU USE CRYSTAL LAKE GRINDERS

EASY OPERATION: CLOSE TOLERANCES: ACCURACY: FINE MICROINCH SURFACE FINISH

A CRYSTAL LAKE GRINDER will hold size as well as grind round from .000005 to .000020" and finish from One to Four Microinch SURFACE FINISH. The essentials in grinding are a round spindle, taper bearings, a spindle that can be adjusted periodically without the squashing of bronze boxes and to have belt pressure ninety degrees from grinding pressure so the bronze boxes will not wear out of round.

For example, fuel injectors, after having been rough ground, can be ground to .000010" roundness with a sixty grit wheel and one pass of the wheel.



A choice of General Electric Thymotrol, General Radio Variac, or Variable Speed Drive can be used without ripple or cine' wave being transmitted to work as all motors are mounted on self-contained countershaft.

Write for literature

CRYSTAL LAKE GRINDERS

Since 1910

CRYSTAL LAKE, ILLINOIS

Use postpaid card. Circle No. 258

New CATALOG

WM. SOPKO & SONS CO.

GRINDING WHEEL ADAPTERS

AND TOOLROOM ACCESSORIES

finest quality ADAPTERS

- Precision-made, Hardened and Ground with Heat Treated Nuts
- Complete Line—4 New Models Available
- For Use on All Popular Surface Tool and Cutter Grinders
- Large Stocks—Immediate Delivery

USE SOPKO ADAPTERS—SAVE TIME, TROUBLE AND MONEY

WM. SOPKO & SONS CO.
140 E. 267th ST. • EUCLID 32, OHIO

Please send your New Free Illustrated CATALOG

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ STATE _____

Use postpaid card. Circle No. 259

L

Lassy Tool Co. 76
(Angle Plates)
Leiman Bros., Inc. 78
(Sandblasts)
Lundholm Mfg. Co. 68
(Coolant Chillers)

M

Mattison Machine Works 47
(Grinding Machines)
McDonough Mfg. Co. 66
(Tool & Cutter Grinders)
Michigan Abrasive Co. 53
(Abrasives)
Minnesota Mining & Mfg. Co. 59
(Coated Abrasives)
Morrison Products 78
(Revolving Cup Guards)

N

National Broach & Machine Co. 16
(Gear Shaving Equipment)
Norton Co. (Grains Div.) 16a
(Abrasives)
Norton Co. (Wheels Div.) ..... 16b, c
(Grinding Wheels)
NuMatic Grinders, Inc. 46
(Grinding Wheels)

P

Pekay Abrasives Inc., Paul L. Kuzmick Co. 77
(Abrasive Wheels)
Peninsular Grinding Wheels Div. ..... 3rd Cover
(Grinding Wheels)
Precise Products Co. 66
(Power Quills)
Production Machine Co. 62
(Grinding & Finishing Machines)

R

Rampe Mfg. Co. 70
(Barrel Finishing Equipment)
Rivett Lathe & Grinder Co. Inc. 20
(Grinding Machines)
Russell Mfg. Co. 57
(Belts)

S

Simonds Abrasive Co. 9
(Abrasive Wheels)
Somma Tool Co. 76
(Grinding Circular Form Tools)
Sopko, Wm. & Sons, Inc. 80
(Grinding Wheel Adapters)
Steuby Mfg. Co. 71
(Cam Generators)
Stone Machinery Co. Inc. 74
(Cut-Off Machines)
Sunnen Products Co. 15
(Honing Machines)

T

Taft-Peirce Mfg. Co. 18, 19
(Magnetic Chucks)
Thompson Grinder Co. 6, 7
(Grinding Machines)

U

U.S. Diamond Wheel Co. 75
(Diamond Wheels)
U.S. Electrical Tool Co. 54
(Buffers, Grinders)

V

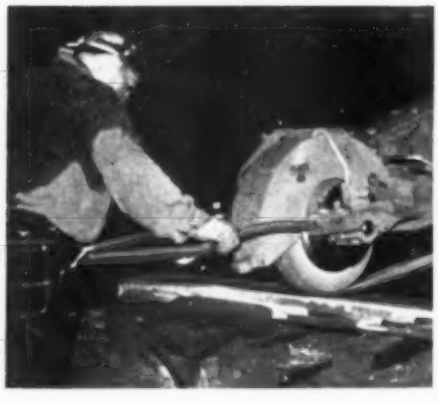
Van Norman Co. 10, 11
(Grinding Machines)
Vulcan Tool Co. 45
(Jig Grinders)

W

Walls Sales Corp. 72
(Belt Sanders)
Weldon Roberts Co. 60
(Abrasives)
White & Bagley Co. 47
(Grinding Coolant)
Willey's Carbide Tool Co. 67
(Carbide Tools & Reconditioning Service)

. 75
78
63
49
66
53
59
78
16
16a
6b, c
46
77
Cover
66
62
70
20
57
9
76
80
71
74
15
18, 19
6, 7
75
54
10, 11
45
72
60
47
67

For "Cool as a Breeze" Grinding Use Superior PENINSULAR Wheels



Enjoy a vacation from grinding worries. Eliminate them by using "always fair weather," time-tested Peninsular grinding wheels. Let one of our experienced abrasive engineers chart a safe course for you by selecting the Peninsular wheel specification that's developed to fit the needs of your particular job.

On a typical billet grinding job, illustrated to the left, the Peninsular wheel specification improved standards as much as 20%, based upon cost per ton. This included longer life and more tons per wheel. Similar savings are possible on all types of grinding . . . yours, for example!

Phone, write or wire us or your Peninsular distributor today. No obligation, naturally!

Resinoid and Vitrified Grinding Wheels

PENINSULAR

GRINDING WHEELS

Circle No. 321

District Representatives and Distributors in All Principal Cities

PENINSULAR GRINDING WHEEL DIVISION—ABRASIVE AND METAL PRODUCTS CO.—DETROIT, MICH.

Metal removal *faster* at lower cost

CHICAGO
MOUNTED WHEELS

Prompt Out-of-Stock Deliveries

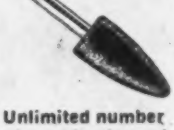
There is a precision-engineered Chicago Mounted Wheel or point for every imaginable grinding operation. Ideal for efficient, effective deburring. . . . Always available . . . in all standard sizes, and over 200 special shapes, for out-of-stock delivery. Save Time – Money – Materials . . . Specify Chicago Mounted Wheels!

Every Chicago Mounted Wheel is produced under positive production control . . . assuring perfect uniformity of mounted wheels and points. There is no variation from one production run to another.

Positive density control for peak job performance

Guaranteed to stay on the mandrel . . . perfectly balanced

Chicago Mounted Wheels are easily dressed and hold their shape



Unlimited number of combinations of dimension, shape, grain, size and bond

WRITE FOR *Trial* CHICAGO WHEELS

Test them yourself!

Send coupon for two Chicago Mounted Wheels . . . Test one against the other . . . you'll see the meaning of true uniform performance!

G

CHICAGO WHEEL & MFG. CO.
1101 W. Monroe Street • Chicago, Illinois

Send me two sample Chicago Mounted Wheels without charge:

Name _____

Address _____

City _____ Zone ____ State _____

Use postpaid card. Circle No. 313